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VIRGINIA.

BY THE COMMISSIONER OF AGRICULTURE.

SECOND EDITION.

RICHMOND:
R. E. FRAYSER, SUPERINTENDENT PUBLIC PRINTING.
1879.

Virginiana

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COMMONWEALTH OF VIRGINIA,
DEPARTMENT OF AGRICULTURE,
RICHMOND, *October, 1879.*

His Excellency F. W. M. HOLLIDAY,
Governor of Virginia:

SIR:

I have the honor to present to you, and through you to the legislature of Virginia, a "Hand-Book of Virginia"—Second Edition, accompanied by a map.

Very respectfully,
Your obedient servant,

THOS. POLLARD.

NOTICE.

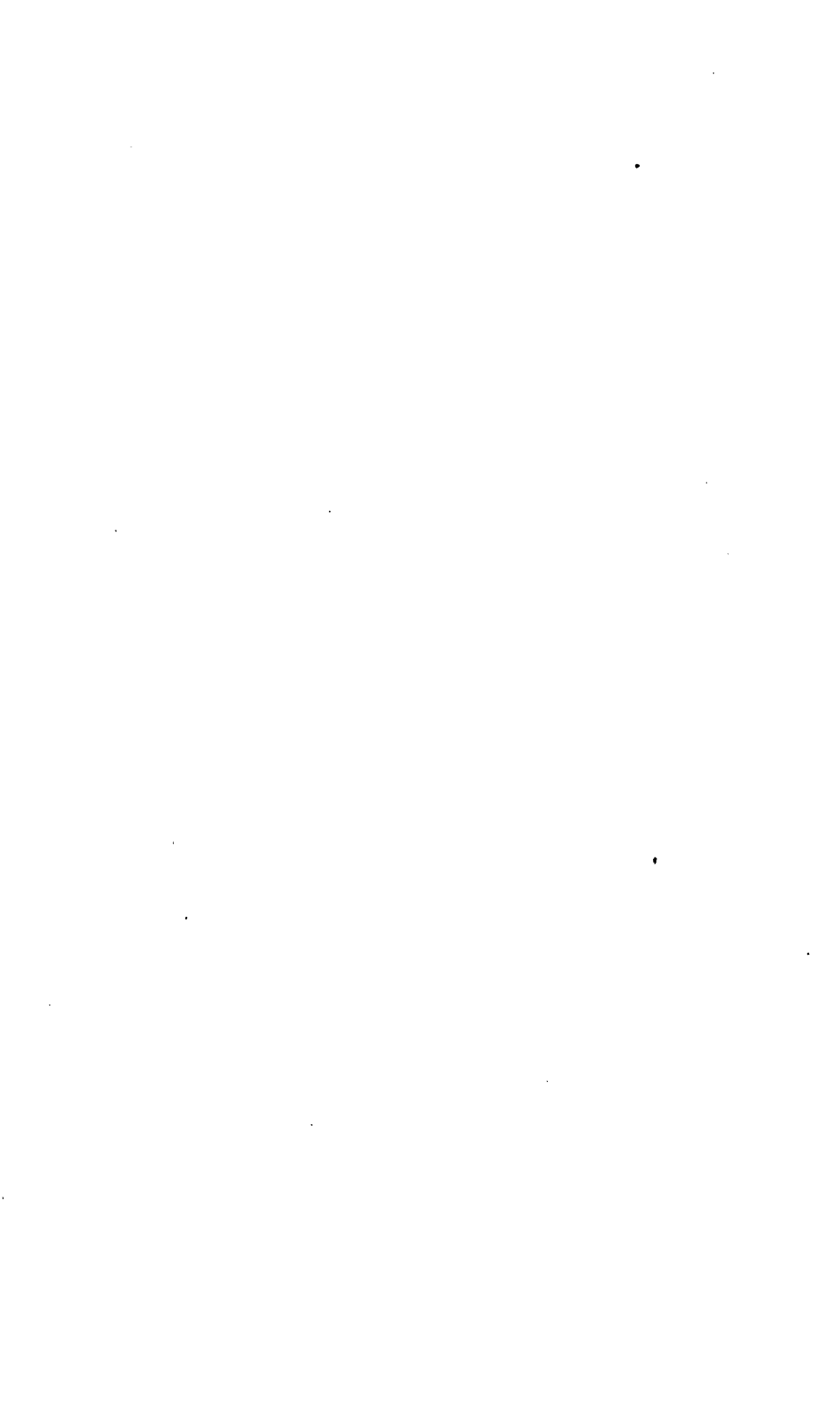
I have thought it proper to issue another edition of "The Hand-Book of Virginia," accompanied by a map, as the first edition is nearly exhausted, and the demand continues. The first edition would have been entirely exhausted, but for my having declined to send out, in many instances, as many copies as requested.

Some errors contained in the first edition have been corrected, and a few additions of more recent information from some of the counties have been made.



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HAND-BOOK OF VIRGINIA.

The act establishing this department requires that the Commissioner "shall prepare, under his own direction, a 'Hand-Book,' describing the geological formation of the various counties of the State, with information as to the general adaptation of the soil of said counties for the various products." It is further provided in this act that the Commissioner shall employ, "in a manner as he may deem fit, a chemist to assist him in his researches, and a geologist to assist him in preparing a geological survey of each county of the State." As before remarked, the fund appropriated is entirely inadequate to employ a geologist for the purpose designated. It was deemed best, therefore, to refer to Professor Rogers' Geological Survey,* and make such practical use of it as I could in describing the different sections of the State.†

Professor Rogers made five geological divisions of the State of Virginia, as then existing, corresponding very nearly with the natural geographical divisions. This fifth division comprised the territory lying west of the Appalachian chain of mountains, containing most of what is now West Virginia.

The first of these divisions corresponding to "Tide-water," and which Professor Rogers says may be called the *tertiary marl region*, embraces nearly all that portion of the State which extends from the eastern boundary, viz: the Chesapeake bay and the Atlantic ocean, and an imaginary line intersecting the principal rivers at their lowest falls. This tertiary, or lately formed region, is divided into—first, *quarternary* or *post tertiary*, and is the sandy shore or margin of the Atlantic and the bay; second, the *upper tertiary*, or *pliocene*, is the first step or terrace of the State above

* This survey was never completed. The larger portion, however, was, and the report for each year, as the Survey progressed, was published only in the Journal of the House of Delegates, some few being printed in octavo form, and several by the Board of Public Works. Unfortunately some of the reports have been lost. The public can only get access to this "Survey" (which remains) in the State Library.

† I have also had access, as will be seen further on, to the Geographical Survey of Scott, Wise and Tazewell, by Professor Lesley of the University of Pennsylvania.

the ocean, and comprises the low plain of the Eastern Shore and Norfolk peninsulas; third, the *middle tertiary*, or *miocene*, is the surface of the second step of country, extending from the western border of the upper tertiary to a line running southward from Matthias' Point on the Potomac to Coggins' Point on the James, and from the James, south, it inclines to the west; and fourth, the *lower tertiary*, or *eocene*, a formation which underlies both the others and extends from the western boundary of the middle tertiary to "the head of tide," constituting a strip of territory fifteen or twenty miles broad. We have quoted from Major Hotchkiss, to whom we are indebted for defining more clearly these divisions as laid down by Professor Rogers. Professor Rogers applies the term *miocene*, or more recently formed, to the strata which occurs in the eastern and greater portion of this region, and from which the ordinary shell marl is procured, and *eocene* to the deposit of an older date, existing beneath and west of the preceding, containing fossils of a different character and marked by the prevalence in considerable proportion of the peculiar mineral called *green sand*.

The first of these, or the *miocene marl district*, corresponding pretty much to the *middle tertiary*, Professor Rogers describes as extending from the Seaboard or water boundary on the east, to an imaginary line drawn through Northbury, on the Pamunky, and Coggins' Point, on James river, in a direction nearly meridional, but through what precise points further observations are necessary to determine. The other, or *eocene marl district*, comprehended between the imaginary line described and another line passing from the mouth of Acquia creek, through Wales at the junction of the North and South Anna rivers, and thence through City Point, and a direction further south not yet precisely ascertained. Much of this district, here defined, exhibits *miocene* as well as *eocene* marl, the former being found either in highlands remote from the rivers, or in the superior parts of the river cliffs overlying the latter. The localities above named were selected as points marking the eastern boundary of this region, because at those places the *eocene* marl was observed to disappear below the water line by a gentle dip to the east. Its existence extensively beneath the *miocene* district may be looked upon as highly probable, though under what circumstances as to depth and inclination of the beds, we have no positive data to determine. The most eastern portion of the *tertiary* or *miocene marl district* has a level little elevated above tide. The rest of the region has elevation above tide, varying from twenty to twenty-eight feet. Few points, however, in this district correspond in level to either extreme. A far larger portion of the surface has a height of from forty to fifty feet. The surface of the more elevated portion is traversed by numerous ravines, in which are frequently found the *miocene*, or carbonate of

lime marls. The ravines are connected with the creeks and rivers, separated by central tracts of farming lands from those connected with the next system of ravines and creeks and rivers.

The number and extent of the large rivers and the navigable streams of this portion of the State constitute the most inestimable of its natural advantages. The numerous creeks indenting this country furnish the cheapest and readiest means for a commerce which comes home to the abodes of its rural inhabitants, while the ravines and river cliffs washed by the tides disclose the rich marls which are destined to bestow the highest rewards upon its enterprise, by spreading fertility and wealth upon the farmers who use them. Good clay for brick-making is found through this region. Over some of the marl beds, as in Surry, is found iron ore scattered over the surface, and in this region, running horizontally below, and sometimes in beds of clay, and generally separated by a few feet from the underlying mass of shells. The analysis of this iron ore is given in connection with the description of Surry, and Professor Rogers thinks it may be successfully worked in connection with the shell limestone. In some portions of this region, as in Essex, are found ferruginous sandstones of sufficient extent to be used for building material. In this section the marl beds are frequently found overlayed with a yellowish brown sand, often containing a large portion of clay. Throughout this mass, and often extending to the distance of five or six feet from the shells, particles of green sand or silicate of iron and potash are more or less abundantly disseminated, and in the immediate vicinity of the shells these particles are generally condensed into narrow strips, conforming in flexure to the irregularities of the bed beneath. Even where a deep hole exists in the layer of shells, the stripes of green sand are seen following the depression and rise of the surface, and preserving a uniform distance from it. Sometimes these thin layers are so much indurated as to have almost the appearance of stone.

The materials in which the shells are intermixed or imbedded, are sometimes nearly a white sand, then again argillaceous matter predominates, and the mass is a somewhat tenacious clay. Frequently oxide of iron is mingled with the earthy matter, giving a brown or yellow color. Very often the lowest fossiliferous stratum is composed of green silicious sand and a bluish clay, which is soft and tenacious, and dark blue color. In the deep ravines of this section are found *blue marls*, in which the shells are soft, and which have been profitably used by many farmers. In some of the marl beds of this region *silicate of iron and potash* are found, and often so abounds as to give a decided color to the whole mass. And in James City and York as much as thirty-five per cent. of green sand has been found, and occasionally shells are found filled with this substance almost alone.

Professor Rogers describes the kind of shells prevailing in these beds, giving their names. This is scarcely of practical importance enough to devote time and space to here. He describes a valuable deposit of marl at King's Mill, near Williamsburg, which extends along the banks of James river, with slight interruptions, two to three miles. Through a height of more than twenty feet in some places the cliff consists principally of shells, of which there are a great many species. On the extensive contiguous estates of King's Mill and Littletown these shells, he says, are largely used as a manure, and for this purpose the first and second beds of chama (kind of shell) are preferred on account of the immense amount of calcareous matter and the large proportion of green sand which they contain. We are not informed whether the use of this marl is continued, though we are afraid not, as the farmers have, in a large portion of the marl region, ceased to use marl. We do not think they are acting wisely in doing so, as we said in our first report, and are persuaded they will return to it as their means and condition improve. In some localities lime itself can be more cheaply bought and applied than marl can be dug and carted and applied, but in many places away from the rivers this is not the case, and where marl containing green sand can be obtained, it is far preferable to lime. The potash in green sand is a great desideratum in our soils, and particularly favors a stand and growth of clover.

Professor Rogers describes the cliffs at Yorktown, on York river, and concludes by saying: "Besides the shells and zoophytes, the bones of cretaceous animals and the teeth of sharks are of very frequent occurrence in the fossiliferous beds, but no remains of fresh water or land animals have as yet been discovered. The total number of species of shells from these points which have as yet been identified is about thirty-six, to which may be added several new species recently discovered and described in a joint paper by Professor H. D. Rogers and myself."

The springs and wells of this region are, on the eastern portions, generally impregnated with a notable proportion of common salt, though rarely with enough to make the water objectionable. Professor Rogers mentions one spring in James City county, near Williamsburg, 400 cubic inches of the water of which contained $104\frac{1}{2}$ grains of solid matter, of which 49.84 grains was muriate soda (common salt), and 26.73 grains carbonate of lime. In the marl region of this section carbonate of lime is frequently found in the wells and springs, producing hardness of the water, but this is not in such quantity as not to be easily remedied by boiling. It is not to be supposed that this salt found in the springs and wells of this region can be derived from the ocean by filtration, as the distance for this is too great. It is more probably derived from the

former impregnation of saline matter obtained from the waters of the ocean, beneath which nearly all the strata of this region were originally deposited. The value of the marls of this region is chiefly due to the *carbonate of lime*, and the value of particular beds to the quantity of lime which analysis has shown they contain; though the various mixtures of earths and other substances with which the calcareous matter is usually associated, are believed not to be devoid of useful action when applied to land. For information as to the value of these marls and their proper use, the farmers of this region are referred to Mr. Edmund Ruffin's work on "*Calcareous Manures*" (last edition). Professor Rogers enumerates the three kinds of marl found in this section, viz: the "pulverulent white marl," the "blue marl," and the "hard ferruginous marls." Of the first kind many extensive beds have been opened in Middlesex, New Kent, James City, York and Gloucester, all of them largely abounding in calcareous matter. As much as ninety-seven per cent., Professor Rogers says, was found in a specimen from one of these localities. We suspect this was more likely obtained from New Kent, near St. Peter's church. We have seen this, and to the eye it looks almost like pure lime, and the people in this vicinity have used it for building purposes by burning it.

The second, or "blue marl," has less carbonate of lime than the first, but the soft condition of the shells and some green sand which it usually contains, causes it in many instances to act well and promptly. The blue color is due partly to carbonaceous matter, derived probably from the organic matter originally associated with the shells, and partly from minutely divided green sand, which it often contains.

The white and brown colored marls are found resting above the deposits of the blue marl. The last, or hard "ferruginous marls," are considered less valuable than the other two on account of the hardness, the shells being often cemented into masses by union of ferruginous, sandy clay. From the quantity of carbonate lime which this marl contains, there is no doubt it may be converted into valuable material for the land, by burning. Professor Rogers says a specimen of this marl from the cliff at York, contained eighty-seven per cent. of carbonate lime; as large a proportion as most of the valley limestone has been found to contain, and he says "it is well worthy of consideration whether the conversion of this material into lime might not be an object of profitable enterprise. In the neighborhood of York, and other places where it occurs, rock of sufficient hardness might be obtained in great abundance and at comparatively little cost, and the cheapness of fuel would render the operation of burning, one of little expense. * * * Regarding it in its true light, as *tertiary limestone*, we see no reason why it should not become a source of profitable manufacture in its immediate vicinity."

Professor Rogers next describes the *green sand, sulphate iron, sulphur and other matters associated with the marl beds* already mentioned. Green sand is often found mixed in the marl beds of this miocene region, and also in the overlying stratum of clay or sand. From the remarkable effects of comparatively small quantities of this material when applied to land, there can be no doubt that many of the marl beds of lower Virginia owe some of their value to its presence. Such for instance, marl beds found on "Hickory Hill" estate in Hanover, the residence of General Wickham, the effects of which were described in a letter from General Wickham, published in my first report.

Supposing only ten per cent. of this substance in a marl, and this is far below the amount found to exist in many localities, one hundred loads of marl would correspond to ten of the green sand—an amount which in New Jersey has often been found productive of striking benefit. Some of the marls of this region are more remarkable for the amount of green sand than the calcareous matter which they contain, and such marls always act well on land.

Sulphate iron and sulphur are sometimes found in these marls, but whether their effects have been hurtful or beneficial, seems not well determined. The general impression is that the sulphate iron is hurtful. Professor Rogers says in some instances these copperas (sulphate iron) and sulphur clays have been found very beneficial, and seems to think it is due to the protection which these substances afford against insects. He says, "in a cotton field in which the alternate rows were lightly sprinkled with earth of this description, the plants so treated grew up vigorous and healthy, while the others became sickly, and were nearly devoured by insects." But much more observation is necessary to determine the action of these agents. The effect just mentioned may be due to the destructive power over insect life, or to their fertilizing property, putting the plant beyond the power of the insects to injure it by its rapid growth; more probably it appears to me the latter, though it is hard to determine. The presence of the copperas (sulphate iron) may be determined by steeping the earth in water, straining off the clear liquid, boiling it down to a small volume, and then adding tincture of galls or prussiate potash or decoction of oak bark. A black or brown color with the former or latter, and a blue one with the second, will show the presence of the copperas.

Professor Rogers next describes the *eocene or lower tertiary marl* region. The *eocene* is overlaid by the *miocene*. Westward of the limits of the *miocene*, previously described, the general level of the country continues gradually to rise. A surface more generally undulating, and strewn with water-worn fragments of stone, sometimes of considerable size, marks our approach to the region of hills and rocks, whence the memorials of the destructive forces of a former period have been derived.

The superficial strata in the western portion of this district is generally of a coarse sand, or gravel, often containing large masses of rounded sandstones and other rocks, of which the present strata are generally to be found at no remote distance to the northwest. Beneath these beds of gravel in many places strata of clay occur. Many beds of very argillaceous clay, suited for the potter and brickmaker, and occasional layers of pure, beautiful ochre, may be placed in this portion of the series. Other strata of clay, and sand of a peculiar appearance, present themselves in many localities beneath the superficial beds. In these clays are found impressions of shells and zoophytes, and on comparing these casts, which in most cases can be easily recognized, even in their more delicate markings, with the fossils of our miocene marl strata, their identity is established, and thus the strata in question at once take their places in the series of miocene tertiary deposits. In many parts of Hanover, King William, Henrico, and other counties in this range, these beds of clay are found usually characterized by a dark greenish gray or brown color, a sulphurous odor, and an astringent taste. On Governor's Hill, in Richmond, a stratum of the same kind is exposed, and at this point the fossil impressions, and other characters above noticed, may be distinctly seen. Like the clays and sands above described as associated with the miocene, these contain sulphate iron (copperas), sulphate alumina (or alum), and sulphur uncombined. So large a portion of these substances is sometimes found as to render the water obtained from these strata unfit for use. It is to the existence of these sulphates that is due the disappearance of the carbonate of lime in the form of shells, which they plainly once contained. The sulphuric acid contained in the sulphates of iron, or alum, has been sufficient to decompose the lime forming sulphate of lime (gypsum), which, being soluble, has washed away, the carbonic acid of lime escaping through the atmosphere. These clays are either useless or injurious, applied to land.

Though much of the miocene marl in this region has been exposed to these destructive agencies, much is also found containing its carbonate lime undiminished in quantity. On the lower levels of the river banks marl has been thus impaired, while that on the highlands is found generally to contain its carbonate lime unimpaired.

As has been said, the *eocene* marl underlies the *miocene*, and it is probable that deep excavations in the highlands even would discover the *eocene* or green sand marl. Professor Rogers says: "In examining the *eocene* deposit on the Pamunkey and James rivers, the interesting geological fact was observed of the *actual superposition* of the *miocene* upon it; and on the Pamunkey the precise point was determined at which the *eocene* first makes its appearance above the water line, being there overlaid by a heavy bed of the more recent deposit (*miocene*). This occurs at Northbury, and directly opposite at the plantation of Dr. Charles Braxton."

This region of *eocene* marls extends from about the falls of the rivers eastward, about 25 miles. The deposits are principally found on the James, Pamunkey, Mattaponi, Rappahannock and Potomac rivers, and their tributaries and valleys. They have been more developed on the two first rivers than elsewhere. Professor Rogers says, on the south side of the Pamunkey, the deposit has been principally examined at Northbury, Hampstead, Retreat, Washington Bassett's, Walker Tomlin's, Mrs. Ruffin's, Mrs. Roane's and Mr. Wickham's, where it terminates; and on the north side at Chericoke, Captain Hill's, Mr. Nixon's, Pipingtree, Newcastle, Dr. Braxton's and Mrs. Fox's. He says, in describing the *eocene strata of the Pamunkey*, "rising above the water line at Northbury, the upper surface of the deposit is seen ascending with a very gentle slope, as it extends higher up the river, until at Newcastle it attains an elevation of about 25 feet above medium tide. Beyond this point, with slight undulations in its outline, it continues with but little general deviation of height from the water-line, to near its termination at the junction of the North and South Anna rivers, where it dips, or thins out, until lost immediately on the verge of the coarse sandstone, which, there for the first time makes its appearance in massey form. The deposit appears on both sides of the river wherever the flats do not intervene, and at the base of the second level, corresponding in position to its place in the river cliffs in the same vicinity. Above these deposits of marl in this region, is usually found a stratum of greenish yellow earth, containing no shells, but numerous casts of them, showing that shells were at one time embedded in the mass, but higher up the stream in this stratum are frequently found multitudes of shells, often in a perfect state, and below this, a layer of darker hue containing less shells and smaller kinds. All these strata contain larger proportions of green sand and often gypsum in the upper strata; the granules of the green sand in the lighter colored and upper strata being very obvious to inspection, resembling grains of gunpowder, and when bruised, presenting a light green appearance. In the lower beds they are more minute and not readily recognized, except by the general green appearance of the mass. These beds also contain considerable quantity of mica in sparkling fine scales. Miocene marl is also found in this section, above the eocene marls. On James river the eocene marl is found at "Coggins' Point," and Tarbay and Evergreen, on the southern shore, to a short distance above City Point, with some interruptions, a distance of about 10 miles. On the opposite shore it is found at "Berkeley." On the southern shore, the cliffs have a height varying from 30 to 40 feet. The miocene marl, which in some places is found overlaying the eocene, abounds in scallop and other shells, which make it easily recognized.

Beneath this, and usually separated from it by a thin line of black pebbles like those occurring on the Pamunkey, there occurs a stratum of greenish red and yellow aspect, containing much green sand and gypsum, the latter partly disseminated in small grains, and partly grouped in large and massive chrystals. The under stratum, rich in green sand and containing a few shells in friable condition, extends to some depths beneath the level of the river, and appears to rest upon a bed of clay of lead color, containing chrystals of gypsum. At "Evergreen" a stratum of pure white clay rests upon the upper layer of eocene, containing imbedded in its lower surface large groups of chrystals, and seems to occupy the place of the black pebbles before mentioned. The whole thickness of the eocene deposit at this point appears to be about twenty feet. On "Turkey Island Creek," flowing into the James in Henrico county, are found rich deposits of green sand marl which have been very successfully used in the agriculture of that region.

This eocene deposit is also found on the Potomac, Rappahannock and Mattaponi. On Potomac Creek and on the Rappahannock for a considerable distance below "Port Royal" the eocene marl is found very similar to that on the James and Pamunkey. On the Mattaponi the occurrence of green sand stratum has been ascertained in some places, while in others the beds containing the substance have been replaced by beds of clay, which are less likely to prove agriculturally valuable. The olive earth overlaying some of these beds, particularly on the Pamunkey, seems to have lost its lime which it once contained, and has but a small portion of gypsum.

Of the agricultural value of eocene marl there can be no doubt. It has been used with great success in New Jersey, and very profitably on the James and Pamunkey in Virginia. For some time beds containing a portion of carbonate of lime (shells) and gypsum were sought after, particularly on the Pamunkey, to the neglect of the underlying green sand. Afterwards the green sand was learned to be appreciated. On "Turkey Island Creek," in Henrico, deposits were found void of shells, which have been used to great advantage, particularly in promoting the growth of clover, and secondarily of the cereals. The effect of green sand is very permanent as well as very efficacious from the beginning. In New Jersey it has been used in almost unmixed condition for many years, and is highly prized as a fertilizer. There, it is said, as small an application as ten or fifteen bushels to an acre is uniformly attended with most excellent effects, whether the soil be clay or a light sterile sand. Professor Rogers quotes the following from his brother Henry D. Roger's report on the Geology of New Jersey: "When we behold a luxuriant harvest gathered from fields where the soil was nothing originally but sand, and

find it all due to the use of a mineral sparsely disseminated in the sandy beach, we must look with exulting admiration upon the benefits upon vegetation conferred by a few scattered granules of this unique and peculiar substance. The small amount of green sand dispersed through the common sand is able, as we behold, to effect immeasurable benefits in spite of the great preponderance of other material, which we are taught to regard as, by itself, prejudicial generally to fertility. This ought to exhibit an encouraging picture to those districts not directly within the limits of the marl tract, where some of the strata contain the green substance in sensible proportion. It expands most materially the limits of the territory where marling may be introduced, and points to many beds as fertilizing which would otherwise be deemed wholly inefficacious."

Professor Rogers gives analyses of seven of these beds of eocene marl in Virginia, which will be found given in the description of the counties in which they are found. Analyses of the miocene or shell marl will also be found included with the counties where these beds exist.

Where these marls co-exist some of the effects are, of course, due to the lime, and some to potash in the green sand, but where the latter exists in good proportion, the influence is no doubt due more to the green sand than the lime. Sulphate lime (gypsum) existing in many of the eocene marl deposits, no doubt on some soils exerts a beneficial effect.

The dark, greenish clays and sands in this region have sometimes been mistaken for green sand. These clays are destitute of fossils, and have an astringent or copperas flavor, and generally a strong sulphurous odor, though a slight sulphur odor is sometimes discovered in the best marls. Small shells, well decomposed, are often found sparsely distributed through these eocene marls, though an almost total absence of shells is sometimes observed in some of the best of them, as, for instance, those of Turkey Island creek, in Henrico. Fine, sparkling scales of mica have been mistaken in these deposits for gypsum. The kinds of shell often found in the miocene and eocene marls serve to distinguish them when there is any doubt about the classification of the variety of marl. The saddle-shaped oyster is found in the eocene or green sand marls, and not in the miocene or shell marls; and the common scallop or clam is found in the latter, and not in the former.

The eocene marls have been extensively used in the past, and some are using them now, but to a limited extent generally; and the same remarks are applicable to the miocene. It is to be hoped that their use will be resumed generally, as where the deposits are accessible and of good quality, there can be no doubt of the value of their application; and this particularly refers to the green sand variety. Where these latter deposits exist on the rivers, it would no doubt be profitable to transport to farms

up and down the rivers, and probably over railroads for short distances, where the roads touch the rivers. Formerly these marls were boated up and down the rivers in lighters, particularly on James river. As the condition of affairs improves, and farmers acquire more means, they will no doubt find it much to their advantage to use these marls, to increase the fertility of their lands.

MIDDLE VIRGINIA.

Professor Rogers describes this under the head of "The Region Between the Head of Tide and the Western Flank of the Blue Ridge." This region is primary, and is believed to be the first "dry land" that appeared in Virginia. Its geology is interesting, and is practically important, as it relates to valuable deposits of coal and gold and other minerals.

SANDSTONES OVERLYING THE PRIMARY ROCKS ALONG THEIR EASTERN BORDER.

The primary rocks which are found at the falls of the principal rivers, are, along their eastern out-crop, overlaid by sandstones of various degrees of coarseness, which extend some distance below the head of tide. These sandstones are found in the same line south of Appomattox river, in the upper part of Greensville, and through Brunswick, and, as is believed, in portions of the adjoining counties. They are composed of quartz and feldspar in rather loose cohesion, the feldspar often decaying rapidly on exposure, and furnishing potash to the soil. In certain localities the sandstone has a fine, close texture, suiting it for various useful purposes, and has been employed for building. Professor Rogers speaks particularly of the quarries near Fredericksburg and Acquia, which present, he says, "beds of great thickness of a homogeneous rock of this description, of which extensive use has been made in some of the public edifices in Washington, Richmond, and elsewhere." These sandstones have generally now been superseded by the granite, on account of its greater durability. In the superior portions of these beds of sandstones, lignites, silicified wood and vegetable impressions are frequently to be seen. In connection with these sandstones and the rocks of the coal measures, there occur in several places beds of earth sometimes having nearly the firmness of soft rock, containing a considerable portion of calcareous matter. In Prince Edward, Dr. Morton discovered these clays and semi-rocks sometimes so liberally impregnated with lime, as to furnish a strong and valuable marl. At other points a mixture of carbonate lime

and carbonate magnesia are found in large beds having a texture similar to the materials above described. An analysis of a specimen of this substance from Bear Island, in 60 grains contained :

Carbonate lime.....	31
Carbonate magnesia.....	18
Alumina.....	3
Silica.....	7
Loss.....	1

Professor Rogers says this calcareous matter is to be looked upon as a happy circumstance, and thinks that the magnesia also would be useful in agriculture, and suggests that the magnesia would furnish a source for the manufacture of carbonate, and also sulphate magnesia.

On its eastern limits, coinciding with the lowest falls of the principal rivers, are found strata of gneiss and granite, which are now well recognized as valuable material for building. They are of great durability, and are extensively used in the vicinity, and are transported to different parts of the United States for building purposes. At Richmond, these strata occur in heavy beds, inclining at various angles to the east, and are well exposed along the canal and river, and south of the river for some distance above the city, and also below it. The rock at Richmond is a greyish white gneiss, of great density, and hardness and toughness, yet admitting of being worked with considerable facility. Its chief constituents are feldspar and quartz, with dark mica sparsely distributed through it, giving it a light grey color. When the feldspar predominates, the rock is softened and will ultimately decay, and those varieties will be found most durable for architectural purposes in which this excess of feldspar does not exist. With excess of feldspar, which contains potash, the weathering imparts its potash to the soil, and becomes very useful for agricultural purposes. At the falls of the Appomattox, near Petersburg, is found a well characterized granite, possessing a chrySTALLINE structure, consisting of white feldspar in distinct chrySTALS, with a smaller proportion of quartz, with a small amount of light colored mica. In the same neighborhood, other varieties occur of a more compact and fine texture. In the upper end of Goochland, and other counties in the same range, gneiss of a more compact texture prevails. A quarry of this has been worked at Columbia, furnishing an admirable building material. A gneiss of peculiar description occurs in Willis mountain, Buckingham, associated with several interesting materials. The rock is generally of a rich pink or purple, owing to a large proportion of oxide iron disseminated through it, causing it to be very ponderous. The mica and augite (consisting of mica, magnesia and silica, with oxide of iron) which it contains, give it a very brilliant aspect when recently fractured. It is sometimes studded with minute cells, con-

taining iron hematite, and nearly the whole peak of the mountain being made up of this beautiful rock, which, rising in wedge form to the height of several hundred feet, presents a narrow wall of nearly vertical strata along its summit. From its hardness and indestructible nature this material will possess decided value for building purposes, and its color will add to its beauty. Asbestos and kyanite are also found with several other minerals, interesting chiefly in a scientific view. Westward of this belt of gneiss, the rocks assume intermediate characters, until the truly chrysaline character is lost, and numerous forms of slate make their appearance.

At what precise points the rocks of primary character terminate, future researches must determine. The *soils* of this primary region, except where the rocks accompanying coal exist, are remarked for the quantity of clay (often of a very ferruginous character) which they contain. The feldspar of the gneiss and granite is in some of its forms very liable to decomposition by exposure to the weather, and the alkali (potash) contained in it is gradually dissolved out, and the clay and silica, the other constituents, fall to powder, and thus furnish material for soil. The quartz and mica no longer cemented by the feldspar, also disintegrate and mingle with the soil. The hornblende (consisting of silica, magnesia, or lime, or alumina, or some other base with iron), produces when decomposed a deep-red earth, which on account of its composition is usually productive. Hornblende does not always cause this color, as other decomposed rocks will do so. The soils containing mica or isinglass, and those containing clays derived from the decomposition of feldspar, have been found to be much benefited by lime and other calcareous manures.

In the vicinity of rocks containing feldspar, the disintegrating process gives rise to a clay of pure white color and very fine texture, called kaolin, one of the most necessary ingredients in the manufacture of porcelain, of which numerous rich deposits are found in this section. Professor Rogers mentions that one of these beds has been found on the estate of Mr. Triplett, in Goochland, and also in Cumberland and Buckingham. Recently Dr. Dance, of Powhatan, has sent me a specimen of "kaolin" from his county.

Professor Rogers suggests that the prevalence of kaolin in the same region will probably lead to the introduction of an important branch of manufacture, viz: the fabrication of the finer kinds of porcelain, in which such excellence has been obtained by the employment of similar materials in Pennsylvania. On the western borders of the region of which we have just spoken are found talcose and argillaceous slates, micaceous and garnet slates, chlorite slates, and numerous veins of auriferous quartz. This is a portion of the gold region of the state. Before speaking of this region, the *coal* region of Middle Virginia will be briefly described.

GEOLOGY OF THE COAL-FIELDS IN MIDDLE VIRGINIA.

The sandstones and their associated coal-seams of this region rest in a narrow trough in the primary strata. Whether the group is characterized by containing coal to a greater or less amount throughout its whole extent, has not been yet determined. Professor Rogers says: "Traces of good bituminous coal have been discovered over a space about thirty-five miles long from the South Anna, near its mouth,* to the Appomattox river; but there is nothing to assure us that the sandstone in which the coal occurs does not range, at least in some directions, beyond the limits where the coal itself thins away and disappears. Towards the centre of the formation—namely, within a few miles on either side of James river—the coal appears to be thickest, and it is there alone where the deposit has been worked that we can collect facts enough to lead to any general views of a practical bearing regarding the structure of the coal-field. Through the estates of Mr. Wickham, on Tuckahoe creek, the width of the coal-field is about four and a half miles. It seems to expand in width as we follow it to the south side of James river, being a section drawn through the 'Black Heath mines,' probably eight miles across from the eastern to the western outcrop of the primary strata, which compose the floor upon which the coal-bearing group reposes. It is probable that this is about the centre of the basin, and about the widest part of it, as the coal exists in greater thickness here than at any other point north or south of it.

"The thickness of these coal-seams is very variable; the great lower mass which reposes within two feet of the primary rock in the Deep Shaft, and other adjacent mines in Chesterfield, is estimated to be forty feet from its upper to its lower surface. Over this there is another thinner seam, five or six feet thick, separated by a few feet of coal slate. A third still thinner band of coal is found between them in some of the mines. Upon the opposite or western side of the basin two separate seams are wrought in several of the mines. * * * On the southeast side of the coal-field, north of the river, there are also two principal seams, the upper being five feet, the lower about four feet thick, and separated from each other by eleven feet of slate. In both these points, as elsewhere, the upper seam is the purest coal invariably. We thus have at a distance of ten miles, two localities showing sufficient correspondence in the relations of the seams to each other, and to the adjacent strata to establish the continuity of the same beds across the whole coal-fields."

*Specimens have been furnished me recently of coal three miles north of Ashland, in Hanover, near the South Anna, five or six miles above its mouth, of apparently good *splint* coal, and some effort has been made by parties to work the mine, which for the present is suspended, probably for want of means.

Professor Rogers, after speaking of the "dislocations and faults" in these mines, of which he says too little is known to enable one to generalize or say much on this truly important topic, continues: "The greatest number of pits being on the eastern border of the coal-field, it is there that the faults or trouble, as they are generally denominated in this region, are seen."

Along this out-crop of the coal there would seem to extend over a great space one or more very remarkable lines of dislocation, throwing up the coal to the west by a heavy fracture, so as to make of the same seam a double out-crop, and over a distance of perhaps half a mile, bringing the subjacent granite again to view. We witness, therefore, over a portion of the eastern side of the coal-field, two parallel ranges of collieries less than a fourth of a mile asunder. The "Black Heath mines," the "Union mines," and the "Deep Run pits," are said to be along the outer crop, though it is doubtful whether one and the same fracture extends over so many miles of strata. The probability is that several nearly parallel fractures will be found traversing this side of the region, and tending to the intricacy and difficulty of successful mining. In fact three extensive faults affect the strata near the "Black Heath mines," the outer one causing the upthrow before stated, and the others producing heavy down-throws to the west.

* * An exact knowledge, more particularly of the great longitudinal faults, is especially desirable for directing with system the mining operations of this coal-field. There is one general fact of much practical interest disclosed in nearly all the principal mines of this whole coal-field. It is that the main body of the coal lies either in direct contact with the *primary* rocks, or closely contiguous to them. This furnishes a highly important guide, or in fact the only unerring one in the prosecution of new or intricate workings, for it suggests the utility of making the primary rock the object towards which the mining should be pursued whenever a difficulty occurs in regaining the coal displaced by a fault, for if we are surrounded by *sandstone* we may be sure that the chief deposit of coal is to be reached by penetrating across the strata towards the subjacent granite floor."

The sandstones and the primary strata are so much alike that it is sometimes difficult to distinguish them, though the discrimination is all-important. "A magnifying glass will detect a less angular character in the materials of the sandstones than in those of the primary rock. The general range or longitudinal direction of the coal field, or the line of bearing of the out-crop of the coal, is N. N. E. and S. S. W. The structure of the coal field is that of a very oblong basin, composed of a thick series of sandstones variously constituted, super-imposed upon two or three seams of bituminous coal, themselves resting almost immediately in contact with the surface of the primary rocks of the surrounding region.

* * * There is a great degree of unevenness in the thickness of the coal seams over the small areas, for which this coal field is so peculiar. * * * The internal structure of this coal field is one of great intricacy, and this indicates the necessity of boring as the best and surest means of ascertaining the value of particular parts of the formation; for it must be plain that the ordinary mode of mining applicable to other coal fields, may be ruinously fallacious when applied to this. The intricacy of the faults, and the changing thickness of the coal, are features calculated to baffle and defy the anticipations of the miner. A profound knowledge of the nature and extent of the local disturbance around him, together with some general rules applicable to coal mines, may enable him to approximate with considerable accuracy to the depth and position at which he is to meet the coal seam, but he can form little or no anticipation from knowing its thickness elsewhere, what its thickness will be when he reaches it in its new place. In most coal fields he may. The reason of this difference is, that in the present case the coal lies almost contiguous to the undulating surface of the primary rocks below, and must partake, especially in its lower surface, of the plain upon which it was deposited. In most other coal fields the underlying rocks are either sandstones, limestones or slates, themselves originally horizontal deposits, furnishing a level floor upon which the carboniferous matter would necessarily spread itself in an even sheet."

Professor Rogers remarks that what he has said here is not intended to throw a damper upon the enterprise which is developing this coal field, but that he regards it as one of the most valuable deposits of mineral wealth in the area of Virginia, and he considers it his duty by practical suggestions to promote a sound direction to capital employed upon the mineral resources of the State, and to teach caution, but not to discourage. He considers this coal very valuable, both for domestic and manufacturing purposes, and the enormous thickness of the deposit in many of the mines holds out an ample guarantee that if the mining is done upon a correct conception of the internal structure of the coal fields, it must always prove a profitable business to the part of the State in which these mines lie. Professor Rogers strenuously advises the great importance of preserving specimens of the various layers of rock penetrated by the shafts which are sunk from time to time, or in any borings that may be made. These rocks rising above the coal are less apt to be affected by local variations than the coal itself, and most important inferences might be drawn as to the depths of the coal by comparing the rocks as they are crossed in succession, with sets of specimens of the same collected from the adjoining mines. Data will thus be accumulated from which can be inferred much better than at present the extent of certain faults or down-

throws, the nature of which can, as yet, be imperfectly understood from the evidence produced in the working of the mines. From information thus derived, it is not too much to expect that the depth from the surface of the coal in some places in the interior of the basin may be computed.

The mining shafts which have been sunk in this region have been confined to the eastern and western outcrops, under the impression that the coal in the interior of the basin lies too far from the surface to be profitably worked. Professor Rogers, from the position of the sandstones overlying the coal, thinks this implies the absence of any heavy dislocations affecting the middle tracts of the coal field, and is a feature calculated to support the opinion of the propriety of boring for coal in that region. "From the undulating surface in the subjacent gneiss or granitic rock, and of the falls which intersect the region, it is by no means improbable that the coal in the centre of the basin will be found in some places at least sufficiently near to the surface as to admit of being profitably worked, and general analogy would lead us to look for coal in that quarter as thick or thicker as can be seen near to either outcrop. But we do not know anything definite regarding the limits of many portions of the basin, more especially the western outcrop, and there is much to do in following the coal where it is already well known.

"The deepest shaft, that of the 'Midlothian mine,' in Chesterfield, is 500 feet to the coal, and the workings, in consequence of some heavy down-throws to the west, extend to 700 feet below the surface. It is possible that a shaft of 1,000 feet would reach the coal in several places in the interior of the coal-field."

Coal veins have been found in Prince Edward and Cumberland, but their thickness, compared with those just described, is not considerable. Coal has been discovered near Willis' mountain, and in connection with hematite and magnetic iron ores, found there in abundance, may be of much importance if the coal should be found in quantity. On North river, in Hanover, near or on the surface, a material has been found (a kind of lignite), which seems to be imperfectly formed cannel coal, of very beautiful appearance, of smooth, bright fracture in some places, very hard, and looking as if it would make handsome jet ornaments. It burns, though with not much flame. No doubt it is the same vein with that mentioned on the South Anna.

OF THE AURIFEROUS ROCKS AND GOLD REGION OF MIDDLE VIRGINIA.

There are a number of gold quartz veins through this region. Professor Rogers says with the present means of working them there is no doubt that much of the precious metal is lost and thrown out with the gravel,

from which only the larger masses of the gold have been separated. He says at one of the mines he visited the sand and gravel, after being subjected to the usual process of washing, was found sufficiently productive to yield \$5 per day to each of the two persons who were washing it the third time. How far the most improved methods have been applied to these mines we are not informed, but we suspect if want and the fear of starvation impelled men to exertion and exercise of skill and the use of best appliances, as they have done in California, the results would have been many times better than they have been. It is not here as in California, work your mines and find gold or starve, but if it is not at once brilliantly successful, go to some other employment or fall back on other resources.

Professor Rogers says the amazing richness of many of these mines has attracted enterprise to this branch of mining to such extent that the exploration of the most promising auriferous veins has of late been very actively and successfully pursued. In Spotsylvania, Orange, Louisa, Fluvanna and Buckingham numerous veins have been worked for some time, and from many of which rich returns have been procured, and under improved modes of operation still larger profits may be expected. He says, in describing these veins: "The material of the veins is a variegated quartz, sometimes translucent, at other times opaque. It is generally of a cellular structure, fractures without much difficulty, and in many instances contains a considerable portion of water dispersed through its substance. Its surface, recently exposed, displays a variety of tints of brown, purple and yellow of such peculiar texture as to resemble a thin lacquer spread unequally over the rock. The cavities are often filled with a bright yellow ochre, or hydrated per-oxide of iron, which generally contains gold in a minute state of division. Sulphuret of iron or pyrites ('fools' gold') is another material, which in many instances occurs in considerable quantities."

At Morton's mine, Buckingham, it is abundant, and there, as at other places, it generally contains a portion of gold. In the Union mine, near Rappahannock, some of the auriferous veins consist largely of pyrites, which here contains so much of the precious metal as to render the extraction of it a matter of profit. *Silver* is occasionally found in connection with the gold, and this is particularly the case at the Allie Cooper mines, in Louisa, which also contain lead. Mention of the minerals of this county will be spoken of in another place. Sulphurets of copper and lead have been discovered in a few instances in the auriferous rock.

The rocks forming the boundaries of the gold veins vary much in different localities. Talcoose slate, chlorite slate, and a variety of these abounding in garnets, are the most usual. They are commonly of a soft texture, yielding readily to the blast, and even to the pick or spade sometimes.

Instances occur, however, in which the walls of the veins are of such hardness as greatly to increase the expense and difficulty of procuring the ore. An example of this is exhibited at Morton's mine, where the rock is removed with difficulty, even by the blasting process; while at Booker's and some other mines its texture is so rotten that it rather presents the appearance of earth than rock. Veins of the latter, under favorable circumstances, form what are called "deposit mines," or collections of clay and sand and gravel, enclosing a portion of gold, all of which have been removed by the action of water from their original position in the vein to some adjacent ravine or hollow, in which they have been deposited. The rocks adjacent to the quartz are often auriferous, and in some instances have been found as productive as the quartz itself. Of this, several instances occur in the Buckingham mines, and in other localities, no doubt, the same condition will be found to exist. Nearly all the rocks of this region dip steeply to the east, and it is found that the auriferous quartz conform, in the main, to the inclination of the enclosing strata. The quartz is not, however, an instratified portion of the series, which would imply its cotemporaneous origin with the strata. The form and position of the veins is rarely such as to justify this view. We find the auriferous veins in most cases very irregular in their forms, at one point having a thickness of several feet and at another very near to the former, contracting so as only to measure a few inches across. Again, in many cases the vein divides, and the separate portions afterward unite or send off other branches. In Morton's mine the width of the vein varies from seven feet to five or six inches. In Booker's the vein forks, thins, and as frequently widens. At the Union mines, on the Rappahannock, the breadth varies in some cases from six inches to nearly three feet. From the dimension of the vein at any point no certain inference can be drawn with regard to its extent at other and remote positions. This irregular structure, while it diminishes confidence in the constancy of a large and fertile vein, at the same time furnishes grounds for continuing the examination and prosecution of one, which, by its contraction, has become of little value, as an enlargement at a small depth beneath may reveal abundance of productive rock. A practical point is, that although in the main the dip and direction of the vein conforms with those of the enclosing strata, the correspondence is far from being exact, and in many instances, while the inclination of the neighboring strata remains unchanged, that of the vein undergoes very striking alterations. At Morton's mine the dip near the surface is about 20 degrees, while at some depth beneath it becomes 45 degrees, and similar instances of variation might be adduced in reference to other localities.

Professor Rogers is inclined to consider these veins of quartz, not as

coeval with the regularly stratified rocks among which they are found, but as *veins of injection*, the matter being, subsequent to the production of the neighboring rocks, forcibly injected between them by igneous agencies from beneath, rising in the direction of the least resistance, and therefore, generally, but by no means uniformly, following the places of stratification of the rocks through which they passed. We have procured specimens of gold for our cabinet from all these counties, except from Orange.

OTHER MINERALS FOUND IN THE REGION WEST OF THE GNEISS.

After leaving the gneiss and hornblende slate, which extends some distance above Columbia, on each side of the James, the rocks met with are generally various kinds of slates and schists, penetrated occasionally by the veins of gold-bearing quartz, and furnishing material for building and other uses. Analogous beds are also met with in this region, north, east and southwest of that here referred to, ranging through the State in a belt, comprehending what is usually termed the gold region, and bounded on its western side by a narrow belt of limestone, lying east of the base of the Southwest mountain.

After leaving the gneiss and hornblende slate a little below Bremono, in Fluvanna, we come upon heavy vertical beds of a micaceous slate, in which are multitudes of half-developed garnets, and some crystals of cubical pyrites—giving to the surface of the rock the appearance of numerous knots, around which the fibres of the stone are beautifully curved, so as closely to resemble the shading of bird's-eye maple; and hence it may properly be named bird's-eye maple slate. This rock has the lustre and color of plumbago, and evidently contains much mica. It possesses considerable hardness, and may be separated in the quarry in large, regular masses, and hence for slabs, pavements, and general building uses may be advantageously employed. At the Buckingham Iron Works it has been used in the furnace stack, and has been found to answer well.

The *silicious micaceous slate* occurs a little west of the former, of yellowish brown color, and may be quarried out in long rectangular prisms, with smooth surface, hard and durable, and may be considered a useful rock. When intensely heated it becomes glazed on the surface, and is used on the floor of the iron furnace at New Canton. Associated with these beds is one containing crystalline garnets in great numbers, and sometimes of exceeding beauty. This rock often contains much chlorite, and has a general greenish aspect. Large quantities of it have been quarried in building the dam at New Canton, and a portion of it, very abundant in garnets, has recently been introduced into the furnace as an aux-

iliary flux, the large proportion of lime contained in the garnets fitting the rock peculiarly for this purpose, while at the same time it contains a considerable amount of iron.

Valuable *whetstone* beds occur in this region among the silicious and other slates. The trial of that found in Fluvanna, Rockbridge, and other neighboring counties, shows its excellence, and in some instances experienced mechanics have given preference to it over the Turkey oilstone. In the quarries it has the appearance of a log of wood partially decayed.

Rosfing slate of excellent quality is found in this region on both sides of the James river. That found in Buckingham, near New Canton, on Slate river, yields slate which compares favorably with the better qualities of the imported material, both in density, texture and its capacity for resisting atmospheric changes. Many buildings have been covered with this slate, and the quarries have been extensively worked. The rock splits with great regularity, and may be separated with iron wedges into sheets of 100 square feet, and not more than an inch thick. The quarries are now largely worked. We have received during 1877 beautiful specimens for the State cabinet of this department.

Soapstone (steachist or steatite) is found in Fluvanna, Buckingham, Amelia, Nottoway and other counties of this region, and has been utilized for hearths, jambs, stoves, and other purposes. The finer varieties have more recently been used in the arts to give fine polish to some species of ladies' wear, and also for adulteration of soaps.

Beds of *iron ore* have been found in Buckingham, Amherst, Nelson, Bedford, Appomattox, Powhatan, Fluvanna and Louisa, and have been worked, (and in Buckingham as early as the Revolutionary War.) In Louisa, of late years, Mr. Ira F. Jordan has largely worked it, and with profit. At this time the operations of his mine are suspended on account of the low price of iron. This ore is generally imbedded in a brownish yellow ferruginous clay, and fragments are scattered over the surface in the neighborhood of the bed, and throughout the whole gold region surface indications of it may be traced. The ore is a *hematite* in irregular masses, sometimes cellular, and frequently mamillary, the cells often containing acicular white crystals of great lustre. The limestone found on the western side of Buckingham furnishes the flux employed in the smelting of this ore, and when Professor Rogers wrote, Mr. Dean, of New Canton, was producing between thirty and forty tons of iron weekly, much of it of a superior quality. Ore of precisely the same description is found in the gold region above Fredericksburg, and, as in the present instance, in the vicinity of garnet slate. Some fine specks of gold have been found in the cinder of the Buckingham iron works, as might be suspected from the association of this ore with auriferous rocks. Magnetic

iron of very valuable quality occurs at the base of Willis' mountain, in Buckingham, and in several other places of corresponding positions.

Limestone and *marble* are found in the region east of the Southwest and Green mountains. Wherever examined it is observed to have an eastern dip—in some places steep, in others gentle. In Albemarle county and at Warminster, its structure approaches to slaty, and its general color bluish grey. On the Mechunk it lies on slate, in a position such as to render the quarrying comparatively easy. At Warminster it is associated with talcose steatite, and a white silicious rock of fine grain and considerable hardness, which has often been mistaken for marble. On the James, from this point to the neighborhood of Lynchburg, cliffs of limestone are seen, sometimes presenting enormous masses of rocks, and the character of the rock, in some localities, is such as to render it of the highest value. Near the mouth of Tye river, and on the Rockfish, a true marble is found of beautiful whiteness, and of a texture which renders it susceptible of a high polish, and is easily wrought by the chisel. In Campbell, a few miles from Lynchburg, a good marble is likewise found, and limestone is also abundant.

Sulphate baryta, a white and very heavy rock, occurs in contact with the calcareous stratum. It has been mistaken for marble. Further south, these beds of limestone, of various qualities, are known to occur, and they probably extend to the North Carolina line. They have not been properly examined. Leaving out the marble, the beds of limestone believed to exist would be of great value to the agriculture of this region, whose soils probably would be much benefited by lime. In Orange, Albemarle, Louisa, Fluvanna, Buckingham, &c., these limestones might, with likelihood, be used with great advantage on the lands. Professor Rogers says it is not generally known that *slaty* or *micaceous soils* (isinglass), such as prevail in the districts referred to, are known to be peculiarly susceptible to improvement by judicious liming. The experiments made in Pennsylvania and Maryland, have amply proven this to be the case. In those States soils thus characterized, are limed to a large extent, and always with the most decided benefit. Experiments made in Albemarle and other places, limed with lime procured from the limestone beds of which we are now speaking, have demonstrated its value upon the slaty soils in the vicinity, and nothing is wanted to diffuse these benefits through the surrounding county, but a just appreciation of the advantages of liming, the introduction of economical and efficient modes of burning the limestone, and the selection of such quarries as from the nature of the rock are calculated to yield a product containing the largest quantity of lime. A mistaken impression has prevailed that this limestone yields a comparatively poor lime, and to this, in part, may be ascribed the little use which has heretofore been made of it, either in agriculture or building.

It will be seen by the following statement of results made by analysis that the amount of carbonate lime present in these limestones is in some cases large, and in no instance can the lime be regarded as a poor one. In 100 parts of limestone were found :

	Carb. Lime.	Lime.
In 100 of blue slaty lime, Warminster.....	81.4	45.5
100 of blue, with white veins, Warminster.....	88.4	49.5
100 of blue slaty, Mechunck.....	83.2	46.6

The extensive beds of limestone on both sides of James river, in the neighborhood of Lynchburg, New Market, and Warminster, from their very favorable position as regards conveyance, are calculated to become peculiarly valuable. Indeed, no position could be found in the state in which lime-burning can be carried on, on a more profitable or larger scale. By the introduction of perpetual kilns, now generally used in the extensive lime-burning establishments in the Eastern States, much fuel would be saved, and all the lime which the rock is capable of furnishing would be obtained ; while by the plan usually pursued much wood is wasted and the limestone, particularly of the slaty kind, is but imperfectly calcined. With these improvements, and with the better kind of limestone selected for the kiln, there appears no reason why this favored region may not be able to furnish our eastern towns with lime more cheaply than it can be imported from abroad, at the same time that it is imparting to the surrounding country the benefits of improved productiveness and a wiser system of cultivation.

The white marble of Tye river, and one or more analogous veins, may become of much value to the district where it occurs. It has all the characteristics of statuary marble of fine quality, and should not some peculiarity not yet noticed prevent its application to the purposes of the sculptor, it will no doubt be looked upon as a very valuable possession.

OF THE ROCKS, ORES, SOIL, &c., OF THE REGION WEST OF THE LIMESTONE UP THE WESTERN FLANK OF THE BLUE RIDGE.

This district comprises a great variety of slates, sandstones, schists, and other rocks, almost uniformly dipping east, and generally at a very steep angle. Quartz veins are frequently met with, some of which are believed to be auriferous, though as yet no profitable mine of gold has been opened in them. Beds of trap occasionally occur, the material of which, from its dark color and hardness, is known by the name of *iron rock*. In some portions of this region hornblende, talc and chlorite enter largely into the composition of the rocks. A large portion of this area is occupied by sandstones and conglomerate rocks, and the large portion of

its surface is occupied by rocks which do *not* belong to the primary system ; while at the same time they serve to display the modifying effects of igneous agents, as manifested in the changed structure of many of them on a scale of wonderful variety and extent. Professor Rogers speaks of the geological investigation of this part of the State as one of much scientific interest, and being one laborious and difficult, and says enough has been obtained of the region to convince the intelligent geologist of the entire impropriety of the designation of *primary*, which it has heretofore uniformly received. He says this is a prevailing error in regard to the true geological character of the region, inclusive of the Blue Ridge. After leaving the limestone region described, he speaks of slates and schists as being so friable as to be of little use in building, with occasional beds of denser texture, and more resembling roofing slate, and then comes to the greenish and dark blue sandstone of which "Carter's mountain" and much of the region on its eastern and western flanks principally consists, and then describes quarries of dark greenish and bluish rock, which have been opened in many places, and which furnish a material for building which can hardly be excelled for either strength or permanency under exposure. Much of this rock, however, is too hard, and is difficult of separation in the quarry. This is remarkably the case with the green variety, which occurs abundantly for a mile or two east of Merriweather's bridge on the Rivanna.

Grey and yellowish red sandstone are found traversing the county in the general range of rocks, which furnish quarries of very valuable building material. Those beds intersected by frequent veins of quartz are found to be the hardest and most valuable. A bed on the eastern flank of Peter's mountain, near Gordonsville, yields a building stone which comes from the quarry in long, quadrangular blocks of great hardness and durability. In the same bed, examined at points some distance asunder, a great difference in the hardness and consequent value of the material may frequently be observed. It is a guide of some value to select the stone lying near heavy veins of quartz, with smaller veins intersecting its substance.

In Orange, Nelson, Amherst, as well as near Scottsville, is to be found a conglomerate rock, consisting of the sandstones and occasionally the limestones of this region, cemented together by particles of sand, and occasionally a small admixture of carbonate of lime. It is a representative in this portion of the State of the Potomac marble, and some of it, when polished, would present a surface of equal variety and beauty. The occurrence of this rock here obviously marks an epoch of violent action, in which the neighboring strata, of which it may be considered as embodying the veins, were broken into fragments, and these subjected for some

time to the rounding agency of water, at the bottom of which the coarser and the finer sediments were at length consolidated into rock. In the same regions, beds of genuine red sandstone occur. Near Lynchburg a very beautiful greyish sandstone is largely quarried, and in the same neighborhood extensive exposure of various sedimentary rock may also be seen. In nearly all the localities which have been described the dip of the rock is east. At the latter place, however, a very superb exposure of talcose and silicious schist is presented on the river bank, immediately opposite the town, exhibiting the feature so strikingly seen among the sandstones of the North mountain—that of an arch or great bend in the strata, showing the eastern and western dips at its opposite extremities.

On the western declivity of the Green mountain, beds of steatitic rock occur, furnishing a soapstone of good quality. A quarry of it has been opened near the residence of Tucker Coles, Esq., from which slabs and jams for fireplaces have been procured. The color is greyish, and sometimes greenish blue, and with the exception of some of the fine kinds from Vermont, there is probably no soapstone used in the country which combines the valuable characteristics of this species of rocks in a higher degree.

Micaceous and magnetic iron ores occur throughout the Southwest mountain, but especially on Buffalo Ridge, and are particularly abundant near Stonewall mills and Buffalo Ridge Springs. Hematite, containing some magnesia, is seen in a slaty rock at Reuben Carver's, near the above-named mills.

At the "Folly," in Amherst, and in other places of this region, are found beds of rock containing green carbonate of copper or malachite (from which is manufactured beautiful vases, mantels, and sometimes jewelry), sometimes associated with a little sulphuret of copper. The value, at the time Professor Rogers reported, was not then ascertained. In Orange, Taylor's copper mine was worked, but is long since abandoned. Copper ore has been found likewise in Campbell and Buckingham. Among the minerals occurring in this region, are beds of chloritic steatite and chloritic slate in Nelson county, near Variety mills; galena or sulphuret of lead in veins, in quartz, at Rennet bay creek, Franklin county; sulphate baryta, in numerous localities; sulphuret of iron in cubical and other forms, very frequent; plumbago, in considerable masses in Buckingham and Amherst; and brown oxide of titanium in the neighborhood of Lynchburg.

Many parts of this region, as for instance, in the vicinity of Lynchburg, the Buffalo Ridge and the Folly, are likely to form highly interesting localities to the mineralogist, from the variety and character of the minerals they furnish.

What has been said of the rocks of the Southwest mountain and its flanks, will, with but little modification, be found applicable, in a general way, to the rocks of the Blue Ridge and the intervening country. Beds of dark green rocks, containing hornblende, slates, schists, sandstones and coarse conglomerates, succeed each other as we travel west. From the Southwest mountain, and even in the Blue Ridge, the beds of rocks exhibit the same features and the same general dip to the east. In the Ragged mountain, we find a coarse conglomerate or sandstone containing mica, with a structure partly crystalline. Northwest from Charlottesville a conglomerate containing large pebbles of angular quartz occurs, and in the same vicinity, fine-grained yellowish sandstone. Most of these rocks contain a large proportion of feldspar, so as, in some cases when disintegrated, to have many of the characters of a kaolin. A bed of this species, near the University, has been found by Professor Emmet to furnish a material susceptible of numerous useful applications. When baked at a very high temperature, this rock may be made into hones of a very fine and sharp texture. It admits of being readily carved or turned into crucibles and fire-brick, and other useful implements, for which it is well-fitted by its power of withstanding heat.

ROCKS OF THE BLUE RIDGE, COMMENCING AT THE WESTERN BASE OF TURK'S GAP.

With the view of illustrating the structure of the Blue Ridge, Professor Rogers gives a descriptive list of the rocks which occur at Turk's Gap, beginning at the western and proceeding to the eastern base of the mountain. A series of beds, in the main analogous to those described, may be observed at Rockfish and Brown's Gap and other points, but we have not space for the list, which is not so important to present, as he says, from the list given, it will appear that there is no material difference between the rocks of the Blue Ridge and those of the Southwest mountain and the intervening country, and that they seem in the main referrible to a sedimentary origin.

The *soils* of the region from the Blue Ridge east, as far as the limestone, are in many places of a deep red or chocolate color, while in others they present either a grayish or yellowish hue. The former are regarded as the most fertile and chiefly give value to the lands of Albemarle, Amherst and other counties in this section. Professor Rogers says this color and agricultural properties have been generally attributed to hornblende, which by its iron would impart the color, and by its lime, fertility to the land, but that much of the reddest and richest of the red soils of these counties have no hornblende in their neighborhood, and that these proper-

ties are really due to the disintegration of the dark greenish blue sandstone, such as occurs so abundantly in the Southwest mountain. Beneath and mingled with the soils of Albemarle and Amherst, fragments of this sandstone may be seen in all its gradations of condition, from the hard, greenish rock recently separated from the mass to the crumbling, half-earthly and deeply reddened lump, ready to be reduced by the next winter's frost to productive soil. Professor Rogers found by analysis the greenish sandstone and the resulting soil contained a sensible quantity, sometimes two per cent., of lime. Portions of the red soil in Nelson and Amherst, arising from the decomposition of the red sandstone and conglomerate before described, contain lime in larger proportion, in some instances as much as six per cent. of carbonate of lime. A specimen he examined contained 6.75 per cent. of this substance.

OF THE VALLEY OF VIRGINIA.

The sectional line crossing this region commences at a distance of two or three miles from the western base of the Blue Ridge, this being the position in which the rocks of the Valley first become apparent. Of the character of the beds comprised in this interval we have no data enabling us to speak with certainty, inasmuch as the fragments of sandstone derived from the broken strata of that range, piled upon the subjacent beds of the Valley, entirely conceal them from observation. In no place hitherto observed have the rocks of the Valley and those of the Blue Ridge been seen in contact. Future observations through this curious district are necessary to an understanding of the true relation existing between the formations bounding it on either side. Beds of slate and limestone in alternate order, and dipping to the east, occupy nearly all the space west from this to the commencement of the sandstones of the ridges subordinate to the North mountain. Layers of very silicious limestone and bands of sandstone occasionally occur. Between Harper's Ferry and Winchester two alternations of slate and limestone may be observed, the most eastern bed composed of slate, dipping east at an angle of 30° into the valley of the Shenandoah, succeeded by a broad range of limestone of a dark blue aspect, and but little veined, dipping in the same direction, next to which is another bed of slate, followed by one of limestone, both dipping as before.

Professor Rogers next speaks of the belt of limestone which, as it approaches the northern extremity of Massanutten mountain, presents interesting peculiarities. The limestone is traversed by large veins of calcareous spas, with a veined condition of the rock, concerning which the Professor throws out some interesting geological speculations. He says an

investigation of the materials and structure prevailing in the Massanutten mountain cannot fail to prove interesting to the geology of the State, and promises more than any other to reveal the geological relations of the Valley with the regions bounding it on either side, and thus to solve some of the most curious problems with which the student of our geology at present cannot fail to be embarrassed.

In the valleys of this mountain, slates and limestones occur, and beds of coarse conglomerate, of very peculiar structure, constitute an important portion of its mass, and furnish material for mill-stones, now much in use. Limestone is said to occur on Peaked mountain—a portion of Massanutten. In Rockingham, Shenandoah, Augusta and Rockbridge limestones and slates alternate as before, the former in some places passing into the veined varieties, and occasionally presenting bands and beds of *marble* of a good quality. A roll in the strata, or some change and irregularity in the dip, will usually be found to attend the veined or marbled varieties of limestone, and may be looked upon as a useful guide in the search for quarries of ornamental rock. A bed or beds of hydraulic limestone run along the Valley, not far from its eastern side, to an extent not yet determined, and in the neighborhood of Shepherdstown has been quarried and found highly valuable in the formation of water cement. A similar limestone occurs on the North river, about nine miles from Balcony Falls and at intermediate points, but as yet no analysis has been made of the rocks from these localities. Limestone of an analogous character has been found in Botetourt, and even further south. An analysis of this rock from near Shepherdstown has been made, showing it to contain a third of its weight in alumina, while that of the Valley generally contains but a small portion of this earth. Direct trials, however, will best prove which of these hydraulic rocks make the best cement.

The existence of *fossiliferous bands* in some of the limestone of the Valley is an interesting geological fact. Near Strasburg, on Cedar creek, and other points around, the rock displays a great number of impressions of encrine, &c., and some trilobites. At Mt. Meridian Mills, in Rockingham, this organic limestone also occurs; and what is most remarkable, as having heretofore escaped attention, the limestone of Weyer's cave and vicinity occasionally exhibits similar impressions of a very interesting and peculiar character. Further west, in the neighborhood of Mossy creek, fossils occur in a more siliceous variety of limestone, and Professor Rogers speaks of having in his possession a fine specimen of fucus (a genus of algæ or seaweed). Such bands of fossiliferous rocks are common in Botetourt and Montgomery counties.

The limestone of this region would be of great benefit to the lands if properly burned and applied. The impression has prevailed that the lands

of this region must have sufficient lime in their composition from the abundance of the rock. Professor Rogers says that in a great many instances the soils of the Valley contain little or no calcareous matter, even when taken from the immediate vicinity of a limestone rock. The same fact has been observed in Pennsylvania and New Jersey, and there the lime has been of the greatest benefit to the farmers. The lands of the former have been greatly improved, and in the latter, lands before considered almost worthless have been advanced to a state of great fertility by the use of lime. We learn that lime is being applied to the lands in some portions of the Valley.* By several analyses made of these limestones, the carbonate lime in most cases is over 80 per cent., and in some over 90 per cent. of the whole mass.

Another valuable material in this region not much used is *travertine*, or deposit marl, which exists in some places in large quantities. In Jefferson, Frederick, and Rockbridge this chalky deposit forms beds of considerable thickness, and no extensive district in the Valley will be found wanting in this deposit. It is a precipitation of the calcareous matter from the limestone waters, which are universal through this region, and occurs in most neighborhoods where springs thus impregnated are of general occurrence. This substance may be very advantageously used on lands. It requires no quarrying generally; much of it is found in a friable and powdery state, so as not to require burning, and may be applied directly to the land. Its value has been fully tested in other countries, where its effects upon the lands have been of the most ameliorating character.

All the soils of the Valley are not devoid of calcareous matter, and it is often present in some proportion, but it is rarely present in such proportion as to interfere with the profitable application of burnt lime, or the travertine, or deposit marls.

The *iron ore* of the Valley constitutes a very valuable possession. This is manufactured into iron in numerous places. The ores which have been almost exclusively used are hematite of various aspects, known as honeycomb and pipe ores, and many of them yield metal of the finest character. In some portions of the Valley a semi-bituminous dry coal has been discovered, and in the neighborhood of the iron, and it may probably be employed as a very efficient substitute for charcoal in the furnace. This coal occurs in the Catawba mountain and at other points in the Valley, and at the time of Professor Rogers' report he had high expectation that this coal

* Dr. Strayer, of Shenandoah, writes me recently: "Our farmers are beginning to lime, by burning the limestone rock with bituminous coal, with very flattering results indeed. In a few years everybody will be liming." He also says: "The Messrs. Whistler are operating a very large and excellent furnace for iron at Columbia, Shenandoah county. The 'Dora coal-mines' are worked in Rockingham, and I hope with success."

and iron would furnish rich rewards to the capitalists who might engage in iron manufacture. We think these expectations have not been fully realized. He speaks of having made analysis of this iron in the neighborhood of this mountain (Catawba), which gave hopes that a new impulse would be given to the iron manufacture in this portion of the State.

Little definite knowledge has been obtained of the various objects of interest to the mineralogist in this part of Virginia. Carbonate and sulphate baryta, sulphuret iron, pellucid quartz and crystallized selenite, occur more or less abundantly in different places.

Various caves occur in this region, with curious and interesting features. The rich and variegated crystalline deposits and concretions, which are so interesting to visitors, are formed by the solvent action of water upon the various kinds of rocks composed of carbonate lime. The ready tendency of the dissolved matter to separate in a pure and crystalline condition are both beautifully displayed, while the rounded surfaces of the rocks within the caves, and the generally curved contour of the various apartments, give evidence of the wearing, as well as the dissolving energy of subterranean streams. Usually some *disturbances* of the rocky strata will be seen around the caves, and the deep fissures and clefts accompanying such dislocations of the strata furnish a ready explanation of the means by which the agent (water) that has scooped them out originally obtained access to the surface of the rock. We see recently glowing descriptions of the wonders and beauty and extent of a cave lately discovered in Page county.

OF THE NORTH MOUNTAIN AND ALLEGHANY REGION.

The ranges of mountains which lie beyond the general limits of the Valley present several features of great practical and scientific interest. The lesser range of mountains which first interrupts the general undulating surface of the Valley, known by the names of "Little North Mountain," "Catawba Mountain," &c., indicate the commencement of a series of rock entirely distinct from those occurring in the Valley, being composed of sandstones and conglomerates, and of shales, subordinate to the veins of anthracite and semi-bituminous coal, which here discover themselves. The dip of these, as far as observed, is somewhat steeply west. A similar direction of the strata is also seen in the strata of the North mountain, in Rockbridge and elsewhere, but as exhibited in the section of Brown's ridge and Mill mountain, the dip is east. Professor Rogers then describes the location and dip of the red and gray sandstones, and slates and limestone of these mountains; says the rocks of Mill, Brown's and North mountains, being rocks of sediment, and, therefore, having been originally

horizontal, or nearly so, formed one continuous bed, the sandstone lying beneath, the limestone next, and the slate upon the surface. The disturbing forces, throwing up the sandstones of the North mountain, gave them a western dip, while other forces, dislocating the strata to the west, gave them the parallel, but not continuous, positions they now display. West of the Mill mountain, to near the base of the Warm Spring mountain, we pass over slates occasionally exposing the subjacent bed of limestone; but throughout this valley scarcely a glimpse of the sandstone, which lies still lower, can be had. At "Bratton's ridge" the limestone comes out boldly, with an eastern dip; and at some distance beyond a turn not delineated having occurred in the strata, the slate is seen dipping in an opposite direction. This brings us to the little valley of the "Millboro' Spring," which here issues from the pyritous slate; and now the slate is found dipping to the east, until another change brings up the limestone into view, near the "Blowing Cave," and the dip becomes west again; after which, with several rolls or undulations, as seen in the Cow Pasture hills, it settles into an eastern dip, which continues to the boundary of the slate near the Warm Spring mountain. Here limestone occurs, dipping with the slate; and this brings us upon the debris piled upon the skirts of this lofty range. This region, just described, abounds in objects of practical as well as curious interest.

The *coals* of Little North mountain, Catawba mountain, &c., are among the most prominent of these in an economical point of view. From the Potomac to the southwestern counties, the minor ranges of mountains rising in general along the western boundary of the valley are known to include beds of this mineral in the various conditions of pure anthracite and a compound containing variable but never larger proportions of bituminous matter, and which may be denominated semi-bituminous coal. In Frederick, Shenandoah, Rockingham, Augusta, Botetourt and Montgomery, discoveries have been made of anthracite of the purest character; the coal of the four former counties being nearly identical with that found in Berkeley, which is of the very best character, while that found in Botetourt and Montgomery contains a considerable portion of bitumen, though far less than that of ordinary bituminous coal. The veins which have as yet been examined vary from three to seven feet in thickness. That in Rockingham, near Coal Run, is about four feet thick. At this place, and others in the same range, the coal readily falls into small fragments with rubbed and shining surfaces, leading to the belief that a dislocation of the strata has occurred, attended with grinding and sliding actions, breaking up and fissuring the included coal, and by attrition producing the peculiar lustre and streaked appearance which it presents. In some veins, however, this crushing effect seems to have been little felt, and the coal comes from the veins in larger and more prominent masses.

According to an analysis made by Professor H. D. Rogers of the Berkeley coal, similar to that found in the neighboring counties of Virginia, it contains in the 100 grains only 4.94 of grey ash, all the rest consisting of volatile and combustible matter. This indicates a purity exceeding that of the Pennsylvania anthracite in general, which, at a mean, contains about 6 per cent. of ash.

In the coal from Catawba I have found varying proportions of bitumen in specimens from different localities. An average of these results indicates about 14 per cent. of volatile matter, chiefly of a bituminous character. This coal burns with little swelling, is not much inclined to cake or to splinter when burning, and forms a large amount (upwards of 80 per cent.) of coke of very superior kind. It must probably become valuable in connection with the iron of this region.

The sandstones, limestones and slates of this region are all convertible to useful purposes. The pinkish variety of sandstone is quarried in the North mountain to furnish hearths for furnaces, and has a hardness and sharpness which has led to its employment as a substitute for the more expensive millstones. The slate is largely impregnated with iron pyrites, and upon exposure to the air yields large quantities of sulphate of iron or copperas, as well as of sulphate alumina or alum. It is for this reason that the springs in this region frequently possess a sulphuretted, chalybeate and acid character, and that some of them are so efficient in curing cutaneous and other diseases. The celebrated alum rock, on Jackson's river, consists of nothing but this slate, which rises in an abrupt and lofty cliff, forming a semi-circle at the bend of the river, and presenting a scene curious and imposing. The inhabitants of this section, instead of resorting to the springs, are accustomed to make use of detached fragments of the rock, a small quantity of which will impart to water all the flavor and effects of the springs themselves.

Chalybeate and sulphuretted springs coming from the slate described as the Botetourt, Augusta, Rawley, Shenandale, Yellow and Alum Springs, to which should be added those of Rockbridge, Bath, Bedford, and perhaps other counties, have acquired reputation for their healing virtues. Professor Mallet has given an analysis of the Rawley Springs, the most valuable ingredient being protoxide iron and carbonic acid. He says, "that the analysis shows that the water contains carbonates of protoxide of iron and magnesia, dissolved by excess of free carbonic acid, and sustains the high reputation these springs have long had in the treatment of anemic conditions of the system." Thermal waters, abounding in carbonic acid and nitrogen gasses, resembling those of the Warm Spring valley, occur in some localities, an interesting example of which may be seen near Kaiser's, in the Rich Patch mountain.

The *limestone* is capable of furnishing a lime fully equal to that of the valley, and the extent to which it exists renders it accessible to almost every farm for agricultural purposes.

Iron ores, similar to those of the valley, abound on the flanks of the mountains where the limestone occurs, and many successful furnaces are supplied from this source. At "Jordan's furnace," near the Mill mountain, castings of a very superior quality are made from hematite ore procured in the neighborhood of Brushy Ridge; and not far above, on Jackson's river, the great water-power, which is here given by the river as it makes its way through the Ritch Patch mountain, is in part applied to give action to the machinery of a large and successful forge. These wild districts of mountain country undoubtedly possess great resources, which at some future day will show great results.

Most of the rocks of this region contain numerous fossil impressions, and the bare sandstones on the summit of the North mountain, seen from the road passing from Lexington to Covington, display a profusion of encrine and other zoophytes, and the sandstones of Mill mountain, Ritch Patch mountain, &c., present similar vestiges of organic life, together with hollow casts and marks of shells. The surface of these rocks occasionally expose those waving ridges, which are known to geologists as *ripple marks*, and which are referred by them with certainty to the same causes as are found in the present day, producing precisely similar markings upon the sandy surface of the ocean beach. Large exposures of the rocky surface, thus beautifully rippled, may be seen in numerous parts of the North mountain and the other remote ranges, and under the above view of the origin of this curious feature of the rocks, are calculated in a beautiful manner to illustrate the circumstances under which the strata of this region were deposited.

The slates, particularly those in the neighborhood of the coal veins above referred to, present large and perfect impressions of fern leaves and other vegetable remains; and the limestones are rich in shells and madrepores of various kinds, and are often of uncommon size.

A curious and imposing feature in the rocky scenery of many places in this region is the bent or arched arrangement of the strata. On Jackson's river this strange conformation is seen in many places, and one of these instances of bent strata particularly worthy of observation is presented in the deep cleft of Ritch Patch mountain, through which the river makes its final escape from the rugged region in which its progress has previously been so much obstructed. A similar scene, though on a small scale, is presented where the "Calf Pasture river" finds its passage through the "North mountain," and indeed this feature in the position of the strata is a common occurrence in all the mountain ranges of this wild and beautiful

region. The structure of the "Warm Spring mountain," with its sandstones and limestones is next described, and Professor Rogers then remarks that this valley ("Warm Spring") has the character of an enormous fissure, and, considering it in that light, we have no difficulty in accounting for the number of *thermal* springs which it contains. The well-established fact that the temperature of the earth's strata increases with their depth from the surface, in connection with the structure of the valley here described, will at once explain the elevated temperature which all these springs display, while peculiarities in the mineral ingredients of the subjacent beds, which, it may readily be imagined, would account for the gasses which they evolve, as well as the saline and other ingredients which they hold dissolved.

The fossil and other characters of this limestone distinguish it from that found among the mountain chains of the east and west, and it bears a close analogy to the fossiliferous limestone formerly described as existing in the great valley of Virginia. Granting the identity of the two, we would thus have the slates and limestone of our valley occupying a position at great depths below the various mountains and valleys we have been describing, and only appearing at the surface where some great uplifting force has operated, as in the Sweet Spring valley, tossing away the upper and more recent strata. The thermal waters of this region, in virtue of the carbonic acid contained in them, hold in solution large quantities of carbonate of lime. The carbonic acid, in quickly escaping from the water by exposure, permits the calcareous matter to separate, and thus as the stream proceeds this ingredient is precipitated at every step. Hence it is that we find the channel of streams thus impregnated covered with a hard incrustation, accumulating in thickness every day, and even the stones and twigs over which the current flows enclosed in the film of semi-crystalline calcareous matter; and where the agitation of water is greatest there the deposit is most abundant. The travertine formations or deposit marl, produced in the way we have just described, are in some cases of immense thickness and extent. That in the neighborhood of the Sweet springs is probably, in some places, more than 100 feet thick, and every year slowly adds to the amount. At the "Falling spring," near the route from Covington to the Hot springs, a still greater depth of this deposit has accumulated. The travertine, like that alluded to in Jefferson, Frederick and other counties, is capable of being made very useful in agriculture, and of yielding a lime of great purity and whiteness.

Veins of coal have been discovered in many places in the ranges of what is called by the general name of the Alleghany, and the black slate accompanying this mineral is of usual occurrence. One of these veins is seen in the vicinity of Crowes, near the base of the Sweet Spring mountain. Most,

if not all these coals, are of a semi-bituminous character, and therefore are not much prone to cake while burning.

Bands of fossiliferous slate and sandstone are exposed to view in many places among the mountain ridges of this region; and so common is the fossiliferous rock throughout these mountains, that a large proportion of the broken masses met with in the channels of the streams and in dry ravines, which form the beds of winter torrents, are rich in curious and instructive fossil traces. The calcareous matter which once formed these shells and zoophytes has entirely disappeared, leaving hollow moulds, marking the form and character of the fossils which have been dissolved away. Yet so distinctly do these cases preserve all the delicate lines and marks of their originals that they furnish the scientific observer with sufficiently definite knowledge of their peculiarities as to enable him to refer them to their proper places in the arrangement of the naturalist, and, by comparing them with the fossils of other strata and other regions, to make important inferences concerning the geological epoch of their existence.

In the limestones of this region fossil impressions are also equally abundant. At Callahan's, near Crowes, may be seen solid casts of shells, which, with care, may frequently be detached entire. We see from the character of these impressions that the living beings whose traces are thus engraved upon the rocks were once the inhabitants of the ocean, and we look with new interest and astonishment upon the solid texture and towering height of the rocky strata in which these unequivocal traces of *oceanic life* are thus durably impressed.

Brownish slate, occurring in this region, is very valuable for putting on the surface of the mountain roads, which it makes very firm and even, and has been a source of great improvement to the roads.

The *mineral springs* of this region are numerous and very celebrated. Many of them are now in West Virginia. Most of those in Virginia were described in my first annual report. Professor Rogers remarks that the thermal waters appear to be indebted for their impregnation to rocks of a calcareous nature, while the sulphuretted springs derive their ingredients mostly from the pyritous slates; that the Warm and Hot springs discharge a considerable amount of free gas, consisting of carbonic acid and nitrogen, the latter of which was discovered by Professor Rogers, and found to be in very great proportion. Professor Rogers says of the mineral springs of this region: "Viewed singly in relation to the number, variety and high reputation of its mineral waters, this region is well entitled to be proud of the vast resources of which it is possessed. Grouped as these springs are, at a moderate distance apart, presenting within the same district a variety of medicinal character, for which, in other countries, regions remote from each other require to be visited in succession, placed at a

point equally accessible to the inhabitants of the seaboard and the great valley of the west, and situated in a region of grateful summer temperature, of salubrious climate, and of picturesque and diversified natural beauties, they are now rapidly attaining a celebrity for powerful and varied remedial qualities, as well as for the refined social enjoyments which are annually gathered around them, destined ere long to eclipse the older reputation of the famed fountains of the Northern States, and to vie even with the long-established character of the most noted of the watering places of the old world." Since this was written the great Chesapeake and Ohio railroad, the Virginia Midland railroad, the Valley railroad, and the Atlantic, Mississippi and Ohio railroad place these watering places in easy communication with all parts of the Union, and the number of invalids and pleasure seekers who frequent them is annually increasing, and no doubt the time will soon come when this mountain region will contain an immense summer population.

Rich *iron ores* occur along the ridges of this portion of the State, in numerous places, and from the frequency of coal seams among these mountains, will one day be profitably used.

Saltpetre and *gypsum* are found mingled with the earth in many of the caves of this region. Saltpetre has been procured in considerable quantities from time to time. Besides the saltpetre or nitrate of potash, nitrate of lime is found in large amounts, which is converted into salt petre by mixing ashes with it, by a direct chemical action. In the "Organ Cave" *gypsum* is found in large quantity, and it may probably be turned to profitable use.

Professor Rogers describes a nearly horizontal limestone stratum widely extending about the base of Salt Pond mountain and throughout the valley in which Pearisburg is situated, and then mentions the lake near the summit of Salt Pond mountain, in Giles county. It is not on the top of the mountain, but 900 to 1,000 feet above the base of the mountain. Its length is about three-fourths of a mile, width one-half mile, depth fifty-six to sixty feet, and the water so transparent that bottom can be seen in almost every part. Its waters are discharged by a small stream falling in a picturesque cascade of great height. The water is *not salt*, and Professor Rogers says contained no living thing but a species of salamander or water-lizard. Since then the land-locked or fresh water salmon has been introduced by our Fish Commissioner. Professor Rogers, before describing the southwestern district of the State, speaks of the misapplication of the term Alleghany to the mountains which are scattered over this region, and which are, in reality, through much of its extent, only a series of spurs, sometimes merely elevated table-lands, dissimilar in origin and structure amongst each other. He thinks this mistake has arisen through

an exclusive attention to the direction of the drainage of the northern and eastern portions of this division of the State, as for example in Montgomery county the designation of Alleghany has been very strangely and unphilosophically applied to a comparatively elevated portion of the table lands of that county, and by the same mistake the same title has been applied to a portion of the Blue Ridge, constituting the western boundary of Patrick and Grayson counties. This causes the application of a term successively to ridges entirely dissimilar in regard to the materials of which they are composed, and the epochs to which they are geologically to be referred; and what is of much more practical importance, mistaken conceptions of the nature and resources of these districts will be almost certainly suggested on a first view of them, as delineated on the map, from a prevailing idea that a similarity of construction and materials throughout all its parts is to be found in a continuous mountain chain bearing a common designation along its entire extent. He says the western boundary of Patrick and Grayson counties ought to be called Blue Ridge, and no ridge or mountain east of Peter's mountain can, with the least propriety, be called Alleghany.

OF THE SOUTHWESTERN DISTRICT OF THE STATE.

Professor Rogers says of this portion of the State, so little is known further than the existence and value of its gypsum, salt, lead, and iron, that no general views, even of its important geological features, can be entered on with safety for the present. Even the tracing of the limits of those formations that connect a portion of it geologically with the great Virginia valley, would, as yet, be premature. And of the true character of the more western parts we have no means at present of forming any accurate opinion. Hence, in introducing a few remarks relating to its structures and economical resources, little or no regard will be paid to any imaginary lines of demarkation which might be conceived, separating from each other the distinct geological formations, which there is but little doubt, it includes.

This region is known to the mineralogist and miner for the limestone, lead, gypsum, salt, and coal with which it bounds. Much of this region is overspread with fossiliferous limestone of various kinds, as well as other varieties containing no fossils, and approaching, in some instances, to the character of marble. *Semi-bituminous coal* is found in several localities, as on "Stroubles run," &c., in Montgomery, and in other places in the Brushy and Walkers mountain. *Iron ore* also abounds in the same districts. The *lead ores* of Wythe, under proper management, and with good transportation, could not fail to become a large source of profit to the State. The

working of these mines, since this prediction of Professor Rogers, has become very profitable to the proprietors. In the forms of sulphuret and carbonate they contain a large percentage of lead, and require no expensive arrangement, as the sulphur and carbonic acid are readily driven off by a moderate intensity of heat. The carbonate, it appears, is preferred, as it contains purer lead, and the sulphuret, as is frequently the case, probably contains antimony or arsenic. This latter ore, from its earthy appearance and its want of external aspect of lead, has been esteemed of no value, and it was only by accident that its true character was revealed to miners. The sulphuret or blue ore (Galena) occurs in veins of rotten or chalky limestone, the carbonate in beds, generally situated at the intersection of the veins. In the extraction of the metal, wood is employed as fuel, and a simple reverberatory furnace is made use of.

The *gypsum*, as far as is certainly known, extends over a space twenty miles in length, and half a mile in breadth, but probably the area occupied by it is much more considerable. The depth to which it extends is sometimes enormously great. It lies in beds between strata of limestone, slate, and sometimes sandstones, and has to be penetrated to great depth in boring for salt water. In some places it is said to have a thickness of nearly three hundred feet, including the bands of rock among which it is stratified. Its condition is either that of a fibrous chrysaline mass of nearly perfect purity, or a granular bluish grey and veined rock containing a small amount of earth, but still as little mingled with extraneous matter as any of the imported plaster. This precious material, owing to the difficulty of transportation, is yet unknown to any distance towards the seaboard, but in favorable seasons is conveyed down the Holston to the southwestern States. This difficulty has since been removed by the construction of the Atlantic, Mississippi and Ohio railroad.

The salines constitute another very valuable resource of this portion of the State. At the salt works on the Holston the wells are usually from two to three hundred feet in depth, presenting limestone near the surface, sandstone or slate alternating with beds of gypsum several feet in thickness next beneath, and finally a stratum of clay within which the salt water is procured. This clay is reddish, of very argillaceous texture, being in all probability a softened shell, such as that of the brine springs and rock salt of Cheshire, England; and indeed there is a marked analogy between the two regions. There are heavy beds of rock salt found in Cheshire, and not found in Virginia. (They have since been found, however, in great purity, specimens of which have been sent to my cabinet by Mr. George W. Palmer from Saltville.) The proportion of salt in different wells is not uniform, and, indeed, sometimes not so in the same well. In some cases ten gallons brine will make one gallon salt, and sometimes it takes sixteen gallons. Placing

the specific gravity at 2.5, and we have in the former case about 20 per cent. salt. Gypsum is always in the brine, and is about the only impurity.

Coal is found in Montgomery similar to that in the Catawba mountains. Iron ore of peculiar character is found in Grayson, Wythe, and we think in Floyd, yielding in some cases, by the usual smelting process, a metal having all the qualities of steel. The composition of this ore, not now known, would throw great light on this interesting region.

Professor J. P. Lesley, of the University of Pennsylvania, made a geological survey of Montgomery and Wythe counties about 1862, a copy of which I have not been able to procure. In April, 1871, he read before the "American Philosophical Society" a Report on the Geology of Tazewell, Russell and Wise, a copy of which he has kindly sent me. He examined this region more particularly, "for the purpose of determining the nearest possible approach to a workable coal region of a contemplated railway from Harper's Ferry to Knoxville, Tenn." He found the geological structure of that region so peculiar, and so nearly unknown to geologists, at least in any published memoir, that he took pains to portray it. With this report he has an accompanying map, and without this it is very difficult for the reader to get a very intelligent idea of the geology; and I shall only attempt to give some information from the report of a practical character, concerning the coal and iron formations, more particularly the former.

Professor Lesley, speaking of where the real coal field of this country is reached, says: "Its southern edge runs along a straight downthrow lying just north of the Clinch river. I shall first take up this line at Guests river in Wise county, and follow it northeastward ascending Clinch river, and I will give sections of its coal measures wherever I studied them. *Stone mountain*, which is the south border of Guests river coalfields in Wise county, is cut through by Powell's river at the Big gap. Some miles further east its summit is notched by a wind gap (Little gap) through which the turnpike from Wise county courthouse (Gladesville) to Scott county courthouse (Estilville) passes. The *lowest coal bed* is opened on the side of the road a quarter of a mile before reaching the gap; that is, high up the southern face of the mountain. The coal bed is four feet thick and vertical. The core of the mountain is a vertical, conglomerate sand rock. On the south side of the mountain are cliffs of lower silurian limestone. A fault, therefore, runs through the mountain lengthwise. * * On the west side of Guests river, two miles below the mouth of Tom's creek, a *two-foot coal bed* is mined; it lies there flat, under cliffs of horizontal conglomerate rock. Below this place the river enters the canon, through which it rushes for two miles before entering Clinch river. Vertical walls of conglomerate, hundreds of feet high, stand opposite to each other. This is the natural gate for a railway line to the Wise county and Ken-

tucky coalfield. Coal beds are opened up and down Toms creek and its branches. One coal bed, five to six feet thick, runs through the bases of all the hills nearly at water level and almost horizontal. It is mined for family use in the gulches back of Guests station (an old fort), and by Mr. Jessee, and for several miles higher up Toms creek. It is mined up Little Toms Creek and on Crab Orchard creek as a fine six-foot bed of rather handsome, flaming coal, solid enough to wagon over rough roads, and not making much ashes or clinker in the grate. It is at least equal to the general run of the lower coal measure coals in the bituminous coal basins of the Susquehanna, West Branch and Conemaugh. I saw no other beds here, but there must be others both above and below it. I made a measured section of one of these hills, called Robert's Butt (over 700 feet high and capped with a fragment of the great conglomerate sand rock which once covered all the country), as a specimen of the barriers which separate all these streams from one another in the coalfield, and to show how impracticable any railroad line must be which does not follow closely the great water courses. * * It shows the steep rock conglomerate sandstone to be about 700 feet above the (Newberry, Robinet, Grier, Jessee & Co.'s) six-foot coal bed. At one place where the bed has been dug into a little, it yields the best kind of bituminous coal, fat and coking, but friable, with no appearance of sulphur and making no clinker. It is good blacksmith coal and no doubt will make good coke.

"In *Russes creek*, this coal bed is also at water level, and has been mined by Robert P. Dickenson, in the bed of the creek near his house, and in a run a little further east, where a horizontal gangway has been commenced. About five feet of the coal is visible, the bottom not reached, being in water.

* * Upper part of the bed bituminous and somewhat long. From the first twelve inches downward, solid and somewhat like cannel; coal in some parts slightly granular, reminding one of the sand coal in Montgomery county; bottom coal very good for blacksmithing, not much ashes, no sulphuret of iron and no fossil leaves. Streaks of coal through the bed showing numerous minute discs of sulphuret iron in the fissures, so that analysis of the bed as a whole, will give a notable percentage of sulphur, and it will be extremely difficult to pick the coal, if mined extensively, so as to furnish it free of sulphur. It is, however, on the whole, a satisfactory bed, and its harder benches will bear carriage well. The bed dips at least fifty feet southward at this precise place, but not so much over a large area; over it are thin slabs of shaley sandstone with large calamites and stigmaria stem impressions, and over these again a small coal bed which cannot be more than twenty feet, if that, above the other bed. I made a careful survey of the hill to the south of this place, the summit of which is made by south-dipping conglomerate sand rock (sheep

rocks), and found two coal beds outcropping on its north face, and two on its south face, descending Whetstone run to Clinch river. * * The distance from the six-foot bed up to the sheep-rock conglomerate is everywhere about 700 feet, and contains at least two coal beds, and there is one more coal bed above the conglomerate. I had no means of determining the size or quality of any one of these three beds, but they are all probably under three feet. * * * It is doubtful whether the coal dug at the lowest water in the bed of the Clinch at the mouth of the Whetstone, be the 'six-foot bed.' It looks more like the second bed above it. But the southeast end of the section is a little obscure, and I had no time to study the exact character of the downthrow of the coal measures against the limestone at this point. It runs through an isolated hill quite surrounded by a bend of the river."

The professor then speaks of the difficulty of a railroad down Clinch valley, the cliffs being from 200 to 300 feet high, and presenting bold and massive cliffs of lower silurian limestone to the river. He says the principal streams and rivers of this section run in the lower members of the lower silurian limestone system, as they do elsewhere near the edge of the free-stone carboniferous land, and then gives the cause of this.

He then, speaking of railroad facilities, says: "As the lower limestones are massive and very soluble, all the streams of the region which flow through them have extremely rough and tortuous valleys walled in at intervals with cliffs; the smaller streams head up in the smooth valleys (of the upper limestones and slates of the lower silurian system) admirably fitted for railroad locations. But near their mouths, where they cut rapidly down through the lower limestones, to flow into the cross streams, their beds are full of jagged rocks, and their valleys difficult for cheap railroad-ing. It is among these lower limestones that beds of *brown hematite iron* lie. * * At the ford at the mouth of Lick run is a mass of sandy limestone near the bottom of the lower silurian system. Further up the north bank of the river, east of Lick run, is a long limestone hill, on which many pieces of the ore are scattered, some of them very large. There is a good chance here for the existence of a valuable iron-ore deposit on a large scale. The ore is good."

No examination above Lick run for a good many miles was made. Some of the coal beds in this interval were *reported* to the professor as ten feet thick. The "six-foot bed" may become thicker at points not visited than where he saw it. The "Mouth of Indian" is a thriving little village on the north bank of the Clinch, where it enters Russell county. Professor Lesley says: "I surveyed this neighborhood carefully because the coal beds have been opened more extensively than elsewhere, because they stand at a higher angle and give a series, and because the downthrow is

exhibited in a most curious and instructive manner. The river breaks through limestone just above Indian Creek Mouth, forming bluffs which are called Cedar bluffs. A dam was built here forty years ago out of cedar logs, which has never required repairs. It is fifteen feet high and backs the water two miles. Middle creek descends from the north and enters just below Indian creek. Up Middle creek are coal mines. Two miles further down the river Big creek runs across the upper end of the wide and fertile bottom called the "Rich land," at the farm of Mr. Gillespie. Two miles further west a salt well 354 feet deep was sunk at the north edge of the river bottom, on Mr. Kendrick's land, twenty-two years ago, and at the depth of 337 feet went through 6.7 (six feet seven inches) of coal. *Petroleum*. There was enough of this oil to grease the rods. The well was plugged up. Recently the plug was knocked out, when *fresh water* spouted from the three and half-inch hole to the height of three feet, but soon subsided. A film of oil stands on the water, which is very cold and too brackish to taste perfectly good, although cattle prefer it to other water. The spot selected for the well had been a famous deer and buffalo "lick," and the ground had been eaten away by the animals. Thirty or forty deer used to be seen at one time at this lick, and spoonfuls of salt could be collected. The salt wells of eastern Kentucky get their salt from the conglomerate at the base of the coal measures. There must then be a salt-water-bearing formation several hundred feet below the coal bed, at the bottom of this well—supposing, first, that it is the "six-foot bed" of Wise county; and supposing, second, that the sheep rock conglomerate sandstone is *not* the true conglomerate base of the coal measures. But even if the latter supposition be wrong, and the "six-foot bed" be one of the conglomerate coal beds of eastern Kentucky, which is quite a possible thing, there remains a still lower or Knobstone or Devonian salt-water-bearing formation from which the salt water must find its way to the surface through the great downthrow and cross fissures connected with it. This Devonian salt-water-bearing formation is that which supplies our deep salt wells in western Pennsylvania, and is also the same as the petroleum-bearing formation of Venango county.

The coals at the *Mouth of Indian*. The "six-foot coal bed" here has been opened and mined for the use of the neighborhood by Mr. Scott at about one and a half miles up the creek from its mouth, and again at a quarter of a mile further up on the same south dip. The bed is here but two and a half to three feet thick. It is covered with a plate of sandstone several feet thick. * * Here also the bed which, when doubled (the pressure produced by the great downthrow has folded the coal bed, with the sand rock back upon itself) measures five or six feet thick, is really but a three-foot bed. There is nothing to identify it with the "six-foot"

coals of Wise county ; but it may very well be the 6.7 coal of the salt well, three miles distant. It is opened again about one hundred yards higher up the creek and on a *north* dip of 50°. The Confederate army mined it pretty extensively. It is here three feet thick, in three benches each a foot thick, the top and bottom benches good, the middle bench bony. Over it are three or four feet of slates, and then comes a one-foot bed of bony coal. * * All this is not very encouraging to miners, but the same bed has been opened at the crest of the anticlinal, which has here sunk to the level of the creek, and here the coal lies flat in the water, and several pits sunk through it are deeper than the height of a man. The bed must be nearly or quite six feet thick, and yields good coal (as indeed it does at the other openings), but what its constitution may be I do not know. * * Its position at the anticlinal will make mining difficult."

The professor then gives reasons to show that the anticlinal disturbance at *Scott's mines*, on middle creek, must be local ; nevertheless the very steep dips of the overlying coal beds and rocks throughout the body of Stony Ridge, make the whole disturbance of considerable magnitude.

Laurel Run coals. These are situated on Laurel Run, a side branch coming into Indian on the northwest. Mr. Christian has here opened several beds, one of which is reported to be *much over six feet thick* ; the coal is wagoned to the county town of Tazewell, Jeffersonville, fifteen or seventeen miles distant, first striking the Baptist Valley road (two miles from the mines), beautifully engineered at low grades, and still the highway between east Kentucky and Middle Virginia, two miles to the Clinch valley road, thirteen miles by either of these roads to Jeffersonville. These coals must come from the same beds and be essentially similar to the Scott coals and the Abb's Valley coal, next to be described.

Abb's Valley coal fields. Just east of the Christian mines runs a limestone valley along the southside of the downthrow, into which the waters sink into caverns ; it is called "Sinking Water." The formation of Abb's Valley, fifteen miles distant, is the same ; but Stony Ridge separates the two valleys and the coal areas which have been followed all the way from Wise county are cut off or whittled down to a fine point opposite Jeffersonville. The Abb's Valley coal beds are brought down to the present surface by quite a different downthrow from the one traced thus far all the way from Guests river, in Wise county, a downthrow *behind* and to the *north* of this one.

The Clinch Valley downthrow going east from Indian Creek catches in its jaws a less and less number of beds and width of coal ground, until at last on crossing the great road from Jeffersonville, north to Tug Fork of Sandy, it holds but the lowest coal bed, standing at a high angle and very little left. This is seen at Captain Frank Peery's coal bed. How far east

this coal can be traced, Professor Lesley does not know, but thinks nothing of value can be expected from it, which is much to be regretted, for at this point *easy* access to the back country ends.

To get over into Abb's Valley coal fields, two mountains, or rather steep stony hills have to be crossed. The deep, rapid, rocky bed of Mud Fork of Blue Stone, lies between the two mountains and descends eastward. The turnpike summit crossing the first mountain is 300 feet above Captain Frank Peery's on head waters of Clinch, and 400 feet above the level of Mud Fork of Bluestone. Clinch and Bluestone run in opposite directions along Wright's Valley, Clinch eastward, Bluestone westward. The "divide" between them is one and a quarter miles east of the turnpike at Frank Peery's, and say one hundred feet higher in level. This route from Greenbrier to Tazewell is feasible, but it is needless to try to get coal out that way.

The turnpike enters Abb's Valley almost at its head or western end. From the notch in the second mountain, through which the road passes to the dry water course in the centre of the valley, is a descent (by barometer) of only 110 feet. Westwardly the valley rapidly fills up, and that is the course to take in locating a railroad from the mines out to Jeffersonville. A feasible route may be obtained by keeping up Abb's Valley to and over its "divide," and down Cavitt's run to the Clinch, two miles west of Jeffersonville. Professor Lesley says: "My advice is, that no coal freight railroad be sought for in the direction taken by the Jefferson and Tug Sandy Turnpike. But, on the contrary, that a line be sought for the west, more down the Clinch, viz: up Cavitt's creek." Let the coal beds there be carefully explored, and a line be found across the "divide" beyond the west line of Abb's Valley.

The coal of this valley is next described. On this side of a hill (delineated on a map of this "Abb's valley coal") a tree being upturned, developed a coal crop. It is considered a workable mine, and probably the only one of this district. Ten miles east of this, and in a similar position, a coal bed is mined, which is judged to be the same one, and it is considered ten feet thick. In the openings at the foot of the hill it has been merely thrown out from the water of the little brook. Mr. Cochrane, who has dug coal all through this region, gives its thickness as a five feet of coal in five and three-fourths space. A dirt bed four inches thick separates the lower bench of very fine coal from the upper and main body of the bed. This coal is dug into by the farmers in several places on the hill-sides of Laurel Fork from half mile to several miles north of Smith's coal. It is called six feet thick. Mr. Cochrane says he has dug it on Laurel, where it was good seven feet.

The coal beds can be opened anywhere in the hills just north of Abb's

valley, and several low wind-gaps similar to that at Mr. Smith's, give the people of the valley access to the coal field, but the railway line which passes through Tazewell, as said before, must approach the coal field from the west, not from the south, around the head of Abb's valley from Cavitt's creek. This will also subserve the interests of any railway projected from the Ohio river up Tug Fork of Sandy to Jeffersonville.

Iron ores of this region : Professor Lesley says, "the valleys of Tazewell and Russell, in Virginia, being geological as well as geographical prolongations of the interior limestone valleys of Pennsylvania, contain necessarily the same kinds of ore in the same formations and in the same condition. I mean that the unbroken ground is at present covered with patches of brown hermatite blossom, just as the ground used to be where our chorcoal furnaces stand, and that the color of the road and field soil is the same as that of our best iron ore banks ; the limestone rocks project in the same style, have the same internal composition, and exhibit the same corroded and dissolved surfaces, and pot-holes, caverns and sinks abound along certain lines of outcrop. All these things are known to bear an intimate relationship with both the original setting free of the mineral iron from the lime rocks and its subsequent deposit and consolidation. And it seems to be becoming clear to our geologists that while there are regular stratified beds and belts of the ore at two or three distinct horizons in the lower silurian limestone formation, which may be traced for many miles along the strike of the rocks, there are also vast accumulations of this brown hermatite ore along the anticlinal axes, especially wherever these are fractured or degenerate into pure upthrown faults. * * It is along the great upthrown fissures, then, that we are first to seek the iron ore deposits of this section of Virginia, and such a spot was pointed out to me near the mouth of Lick run, on the hills bordering the north bank of Chinch river, in Russell county. * * Large masses of "blossoms" lie scattered about the fields. The hills southeast of Jeffersonville, just outside the town, show the existence of ore beneath the surface. Great quantities are reported two miles east of the town, and still more abundant exhibitions in the cove of Wolf creek, behind Buckhorn Ridge, north of the forks of Wolf creek, and opposite Rocky Gap. Immense shows are reported in Wolf creek valley, south of Rocky Gap. I have, myself, no doubt of the correctness of these reports, so far as surface exhibitions are concerned ; and it is an old and good iron master's maxim, that where there is a plenty of blossom there will be a plenty of good ore." It is then shown why the fact is geologically exact ; and it is moreover shown that similar formations exist through the coal regions of southern Pennsylvania, New Jersey and Maryland and Virginia ; and the professor says "it is evident that the great iron-bearing formation at the base of No. 111" slate formation (as laid down

in a drawing of this region) keeps its character all through middle and southern Virginia, and will be as rich and certain a basis for large iron mining and iron smelting operations as any other and better known section of the Appalachian mountain belt between New York and Alabama. An old forge at the west end of Paint Lick mountain used this top limestone—horizon ore—and there is no doubt of its abundance in many other places.

The professor then notices another variety of iron ore along the line of the proposed road, viz., a fossil ore, the "paint or dye-stone ore" of Tennessee. He then explains the formations where this ore exists in Pennsylvania and Maryland, and says "it may be seen by tracing the lines of color on the map, where the fossil ore bed *ought* to be. Very extensive and costly explorations have been necessary for this ore in Pennsylvania and Maryland. No doubt much research of the same sort will be called for in Virginia. *But the ore is there!* and as in Pennsylvania and Tennessee, it will run for miles together in a workable condition as to size and posture, and prove a source of wealth. The principal use of this ore is to mix with other varieties—with the blue carbonate lean ores of the coal measures especially, but also with the inferior grades of brown hematite. The time will come when it will be smelted in connection with the primary ores of the Blue Ridge range and Smoky mountains. The forge which stood many years ago at the west end of Paint Lick mountain in Russell used this ore, and obtained it from the summit of Short mountain to the south. Paint Lick mountain is named from an exposure of this ore on its summit. The situation is one of peculiar interest to the geologist and to the antiquarian; the ore is confined to the very summit of the mountain for some distance between the two ends. Its thickness and extent is unknown, nor do I think that more than a few thousand tons of it are to be expected. Dial knob and Buckhorn mountain are prolongations of Paint Lick. Dial knob may have a good deal of this fossil ore left upon it in the core behind the Dial cliffs; but Buckhorn has lost its ore. Short mountain is a prolongation of Rich mountain westward, broadened by a shallow synclinal, which must hold large quantities of the fossil ore. All along the south of Copper ridge there runs a south-dipping plate of the fossil ore, which has been opened in old times at one point and used in a now abandoned forge. There must be immense quantities of the ore in this ridge. It is known to the inhabitants, however, only as a paint, but this will be a sufficient guide to the iron master. The Indians used the outcrop of the fossil ore bed to paint their faces and their lodges. The deposit on Paint Lick mountain was a famous locality among the aborigines. On a smooth, perpendicular wall of sandstone, facing southward and visible from General Bowens' house and the Maiden spring, there re-

main numerous pictures and symbols of men and animals in red paint, fresh as when made and older than the settlement of the country by the whites. There are extensive outcrops of the fossil ore along Poor valley. Indeed the deposit (whether rich or not remains to be discovered) runs uninterruptedly more than one hundred miles in a straight line along the south flank of the Clinch mountain from Tennessee past Moccasin gap, back of Saltville, past Sharon Alum springs to Hunting camp and Kimberling creeks, and so on eastward across New river towards the James river country. No doubt some sections of this line hold the ore bed in a lean, and perhaps unworkable condition; but it is quite incredible that other sections will not have it both thick and rich.

Now it is along this Poor valley and its outcrop of iron ore that General Haupt locates the line of railway. Even if the Clinch river line be adopted for sake of the coal, and for other reasons, a branch must certainly be made up Hunting Camp creek to the plaster banks at Saltville (there is a branch to this point from the Atlantic, Mississippi and Ohio railroad); and this branch will have the ore crop of Poor valley, and the ores of Tumbling river on the top of Short mountain at its command. It can bring the fossil ore forward to the forks of Wolf creek, where are the before-mentioned large deposits of brown hematite ore, and there it will meet the coal coming from Clinch river. Here, or somewhere lower down Wolf creek, perhaps will probably be located one of the principal future iron works of southwestern Virginia."

PLASTER BANKS.

Professor Lesley then describes the Plaster Banks (Gypsum), at Saltville, and explains the formation of plaster, which is sometimes by the action of sulphuric acid on limestone, and sometimes by sulphuretted hydrogen on limestone. At Saltville, it has been accomplished by the latter action. Shafts have been sunk down here 500 to 600 feet, finding no bottom to the gypsum. The professor mentions the different shafts which have been sunk in this vicinity, some of them up Holston valley for twenty miles, and up Cove creek five miles, but that no attempts have been made further on towards Sharon Springs, but there is nothing to intimate its non-existence, except the absence of outcrops, by which means it has generally been discovered. Captain Smith having struck a copious brine in two of his shafts, the opinion early prevailed that salt and gypsum were geologically connected, and this induced a number of persons to sink in the gypsum outcrops, not for gypsum, but for salt water, but without success, and all hope has been abandoned of making salt, except at Saltville.

Professor Lesley says, it is probable that the limestone wall (south wall) of Holston river downthrow (upthrows of limestone) will, in course of time, be discovered to be converted into gypsum at other points beside those specified; and that the gross quantity of gypsum existing beneath the surface along this part of the Holston river far exceeds any estimate which can be made from the gypsum banks already opened. And for the same reason, it is probable that the limestone walls of the other upthrows of the region will be found turned into gypsum, at least in certain places, and in very considerable abundance. The appearance of the brine in such quantity and of such strength, Professor Lesley says has no reference to the gypsum. "An explanation may be found in the curious lake deposit of the little triangular plain at Saltville, a deposit evidently made in a deep little lake or pond-basin filled with red mud saturated with salt water, gypsum draining, &c., &c." In this mud, the salt water has deposited rock salt, and from this rock salt deposit now rises the copious discharge of brine which furnishes all the brine needful for the extensive salt works. The salt lies in a solid form, mixed and inter-stratified with compact red marl or clay 200 feet below the water level of the Holston, and the borings have gone (at the salt works) 176 feet further without reaching the bottom. On the top of the deposits of mud and salt is a stratum of blue slate, more than 100 feet thick. Over the blue slate lie sixty or eighty feet of gypseous clays. The limestone country being cavernous to great depths, and especially along the face of the downthrows, it is not surprising to notice that the level of the water stands the same for all the wells and shafts sunk at Saltville, and rises and falls in sympathy with the Holston river. This accounts for the inexhaustible supply of liquid. The heaviest pumping has no effect in lowering the level. In 1853 the salt yield was 300,000 bushels, fifty pounds to the bushel, and six bushels to the barrel, at fifty cents a bushel. Five furnaces were then running, and 24,000 gallons of brine pumped daily; 10,000 cords of wood being burned yearly.

During the civil war, four wells were pumped night and day for six months, and yielded 1,000,000 bushels of salt during that time. There were then sixty-nine different "blocks of kettles" going. There are at present (1871) three "blocks" of eighty kettles each (five bushels to a kettle) per twenty-four hours, making 360,000 per year of 300 days.

Preston's gypsum banks yielded 2,000 tons in 1854, the cost at the mines being three dollars, and in flour, five dollars; eighty miles distant twenty dollars. What the yield has been since the war and is now, I do not know. Operations are vigorously carried on at four of five shafts. Plaster is now sold at the mines at \$2.50 the ton; at Sharon Springs, thirty-five miles to the eastward, at \$10 in wagons, and it is carried further east for use upon the soil. Its virtues are well known and highly prized. It doubles the

grass crops and grain, and greatly improves corn. (This applies to some sections only—principally Piedmont and the Valley and mountain regions.) One bushel of 100 pounds is sown to the acre (frequently more). With proper railroad facilities, it would be used on all the pasture lands of Tazewell, Russell and Wise, and other counties of this section.

Professor Lesley then speaks of the probable great extent of these plaster beds, and says: "Nothing can be more irregular than the masses of gypsum underground, unless it be the course to be taken to get it out to the surface. In spite of all mining difficulties, the value and scarcity of the mineral in all other parts of the country, must make its mining in this district always extremely profitable. It must always be in demand, can always pay a high freight charge, and cannot meet with competition from Nova Scotia plaster until it arrives within a hundred miles or so of tide-water. Westward and southward, it may go to five hundred miles without meeting competition."

We have received from Mr. George W. Palmer, treasurer of the Holston Salt and Plaster Company, of Saltville, the following statement of the operations of the mines at Saltville:

"We manufactured and sold as follows, viz:

In 1871.....	460,208 bushels of salt.
In 1872.....	486,384 bushels of salt.
In 1873.....	547,551 bushels of salt.
In 1874.....	537,383 bushels of salt.
In 1875.....	464,833 bushels of salt.
In 1876.....	453,988 bushels of salt.
In 1877.....	422,268 bushels of salt.

For the eleven months in 1878 we are about up to the same amount that we had in the first eleven months in 1877. The gypsum or plaster is worked by two companies—the Holston Salt and Plaster Company and the Beuna Vista Plaster Company. An average of about five thousand tons have been shipped from this depot per annum for the past ten years; I have not the exact figures. There are large quantities of it in this (Smyth) county—enough to supply the world.

We burn wood in the manufacture of salt, and use about 16,000 cords per year; use four furnaces. Hope to commence burning coal on the first of January next from a newly discovered coal mine in Pulaski county, Va., where they have just built (will have it completed by January, '79,) a narrow-gauge railroad eight and three-quarter miles long, tapping the Atlantic, Mississippi and Ohio Railroad at Martin's station, one hundred and twelve miles west of Lynchburg, Va.

Hoping that the above facts will answer your purpose,

I am, yours truly,

GEORGE W. PALMER."

During the past summer I took occasion to visit some of the minerals and mines on the Chesapeake and Ohio railroad, particularly those in Louisa, and obtained some valuable specimens for my cabinet. This county is very rich in minerals, gold, silver, copper, iron, and also lead. The "Walton gold mines," near Tolersville, have temporarily suspended operations, for what precise reason I could not ascertain, as the mines are held at a high price by those wishing to sell, and with proper machinery and skilled labor, it is believed they would be profitably worked. Mr. Ira F. Jordan has recently found on his lands, near Tolersville, gold ore believed to be rich. He has sent me gold quartz which assays \$112 per ton.

Mr. Jordan has also worked very successfully and profitably his iron mines "Victoria furnace," four miles from Tolersville. He has recently sent me a specimen of "the paint or dye stone ore" (red hematite of Tennessee), and which is described by Professor Lesley as existing in Russell and the the counties of the southwest, and as being very valuable, particularly for mixing with other ores to give them toughness. Besides this Mr. Jordan has sent some very valuable specimens of specular magnetic iron ore, iron pyrites, negro-head iron ore and specular iron from Davis' "Rough and Ready mines." About two miles from Tolersville, Professor Pratt (formerly of Washington and Lee University) is working some extensive iron pyrites mines, containing also copper. He is working them to obtain sulphur by a new process—sublimation of sulphur by a high heat in retorts. These mines also contain copper in considerable quantity: pieces of old iron thrown in the water raised from the mines causing a precipitation of copper in sufficient quantity to make it an object to collect it. From the "Allie Cooper mines," in Louisa county, Mr. Tyler has presented me with some very handsome specimens, said to contain by assay—

	Per Ton.
In gold coin.....	\$5 00 to \$7 00
In silver.....	\$15 00 to 18 00
In lead.....	300 to 350 lbs.

From the Walton gold mines, and from Professsr Pratt's mines, I obtained good specimens of gold quartz and iron pyrites containing copper.

VIRGINIA—HISTORICAL AND GEOGRAPHICAL.

Sir Walter Raleigh, in 1585, in the reign of Queen Elizabeth, sent out an expedition to the New World, which took possession of the Virginia coast, and named the country (including North Carolina) *Virginia*, in honor of the virgin queen. Afterwards all the country from latitude 34° to 45° north was known as Virginia, and was divided into the northern and southern colony. The former was afterwards called New England. In 1606 King James I. made grants to the "London company." One hun-

dred and five colonists sent out by the London company founded Jamestown May 13, 1607, the first permanent settlement made by the English in America. The three ships bringing the colonists were commanded by Christopher Newport. The colony met with reverses and was saved from a disastrous end by Captain John Smith, whose history was very remarkable, and one which has excited considerable discussion of late years—one party being disposed to look upon him as a pretender and not entitled to the praise which has been bestowed upon him, and the other defending his ancient reputation. He will, however, always be regarded as one who has played a bold and an important part in the early history of Virginia. In 1609 the London company was reorganized and received a grant of territory extending 200 miles north, and the same distance south of Old Point Comfort and westward to the Pacific ocean. For many years Virginia retained most of this territory, and in 1784 ceded to the "United States" her claims to the lands northwest of Ohio (from which have been carved many of the rich western States) stipulating that the ceded lands should be erected into Republican States, not exceeding certain dimensions, and shortly after this she ceded the territory now forming Kentucky. As early as 1619 the culture of tobacco was becoming profitable, and in 1671, during Sir William Berkeley's governorship, 15,000 to 20,000 hogsheads were exported. The "Declaration of Independence" was proposed by Virginia in the Continental Congress by the Virginia delegation, and ever afterward Virginia maintained an important and influential position among the States.

Virginia is one of the original thirteen states, and is situated between latitude $36^{\circ} 31'$ and $39^{\circ} 27'$ north, and longitude $75^{\circ} 13'$ and $83^{\circ} 37'$ west. Its length from east to west is about 440 miles, and from north to south 192 miles. The area is by State authority 45,000 square miles; by Federal census 38,348 square miles. Commodore Maury puts it down at 41,000 square miles. The number of acres is about 27,000,000. The population in 1870 was 1,225,163, or 27.2 to the square mile, taking the area at 45,000 square miles.

Virginia is generally divided into six grand divisions. First, Tidewater; second, Middle; third, Piedmont; fourth, Blue Ridge; fifth, the Valley; sixth, Appalachia.

We give the following as prepared by Hotchkiss in his "Summary" showing the square miles, acres, population in 1870, and population to square miles of these different divisions:

DIVISIONS.	Square Miles.	Statute Acres.	Population, 1870.	Population to Square Mile.
Tidewater.....	11,350	5,664,000	346,305	30.5
Middle.....	12,470	7,980,800	363,932	29.2
Piedmont	6,680	4,276,200	207,204	32.5
Blue Ridge.....	1,230	787,200	28,558	23.2
The Valley.....	7,550	4,832,000	197,967	26.2
Appalachia.....	5,720	3,660,800	81,197	14.2
Virginia	45,000	27,201,000	1,225,163	27.2

It is proper to give a short sketch of these different divisions at the risk of some repetition of matter contained in my "First Annual Report."

"*Tidewater Virginia*, extending from the head of tidewater to the Atlantic ocean, is penetrated by numerous navigable rivers, which empty themselves into the Chesapeake bay, and up which the tide extends to Richmond, and a line drawn north and south from this point. It embraces thirty counties. It is about the size of Maryland or Belgium, which latter has a population of five millions, while this has only the third of a million. There were thirty people to the square mile in tidewater in 1870, or over thirty-one acres to each; while in Great Britain and Ireland, in 1867, there were two hundred and fifty to the square mile, and in Belgium in 1865 there were four hundred and thirty-eight. The average width of tidewater is about one hundred miles."* This is a highly-favored region. The lands are usually of light character, easily cultivated, responding liberally to improvement, though on the water courses are to be found, particularly on the James, reddish chocolate of great fertility and depth, constituting some of the finest farms in Virginia. For early fruits and vegetables for northern markets this region is admirably adapted, besides being an excellent corn and oat, and a tolerably good wheat section. Though not a grass country, the improved lands produce excellent clover, orchard grass and herds-grass, and the mildness of the climate makes it an excellent sheep-raising region. It abounds in good timber, particularly pine and cypress, and is the source from which immense amounts of lumber and shingles are procured for home use and exportation. No country affords facilities for cheaper living,

* Hotchkiss.

the numerous streams abounding in fish and the best oysters in the world, besides wild fowls. The country is intersected with numerous large navigable rivers, ready to bear the productions, at a cheap rate, to all the markets of the world. The early products have already established a large business with northern markets. Another advantage of this portion of the State is the extensive deposits of marl for fertilizing purposes. These marls consist of white and yellow, and blue marls, the *miocene* marls, and the green sand marl (bluish green in color), *eocene* marls. The terms were introduced by Professor Lyell, and indicate the formation of different geological eras, the first being of more recent origin than the latter. Their location and value have already been described. Both marls are valuable, the green sand marl particularly so.

The following note is from a report on the "Geology of New Jersey" by Professor H. D. Rogers, quoted by Professor W. B. Rogers in his report :

"Mr. Moley, of Monmouth county, New Jersey, manured a piece of land in the proportion of 200 loads of good stable manure to the acre, applying on the adjacent tract of the same soil his marl in ratio of twenty loads to the acre. The crops, which were timothy and clover, were much the heaviest upon the section which had received the marl, and there was the additional fact greatly in favor of the marl over the manure, that the soil enriched by it was entirely clear of weeds, while the stable manure had rendered its crop extremely foul. There is no doubt that twenty loads of marl per acre must be regarded as more than generally necessary, but computing the relative cost of the two manures employed in the ratio stated, we find a considerable disparity in favor of the green sand. Placing the manure at ten cents for each two-horse load, (which is too little), and that of the marl at twenty-five cents per load, we have the expense of manuring one acre \$20, and of hauling the marl \$5.

"Experience has proved that land once amply marled retains its fertility with little diminution ten or twelve years, if it is not cropped too severely, while the stable manure, with all precautions, must be renewed three times at least within that interval to maintain the soil of a corresponding vigor."

In this portion of the State is found the best of clay for brick-making, and on its western limits are inexhaustible beds of best granite. The timber of this section is very extensive and valuable, nearly one-half of the lands being in wood. Besides the means of fertilizing the lands already spoken of there are immense piles of shells found on the ocean front, which may be profitably burned and applied to the lands, and this has been frequently done, in some cases burning oysters and shells together, as the oysters are too salt to be eaten. Refuse fish and sea-weed

are also used with good effect on the lands. The soil varies, comprising the thin, light lands of the *Norfolk peninsula and Eastern shore*, which are very productive, easily tilled, and responding readily to the use of the fertilizers; the stiffer soils of the upper counties, and rich alluviums of the river bottoms, which are almost inexhaustible under cultivation; the second bottoms, with deep clay subsoils and loamy overlaying soil, capable of high production and severe tillage, and the thinner light lands of the ridge country between the streams, which too respond readily to use of marls and manures generally, and seem, with even tolerable treatment, capable of bearing good crops, and of being subjected to hard cultivation, which they have stood for nearly a hundred years. Under more improved systems of tillage, and with proper use of the marls of this region with home-made manures and proper commercial fertilizers, with clover and pea fallows, there is no reason why Tidewater Virginia should not rival England in fertility, for nature has done more for the former than the latter, which, with all its fertility, its teeming fields and its unrivalled scenery, was once, in all probability, a poorer country than our favored Tidewater.

The fish and oysters of this region, with proper cultivation of its lands, will support a very large population—manyfold greater than now inhabit it. The two counties, Northampton and Accomac, on the eastern shore of the State beyond the “Chesapeake bay,” form a highly-favored section of Virginia. Fronting the Atlantic on the east and the Chesapeake bay on the west, the climate is considerably modified in summer and winter by the breezes which sweep over the land from each of these bodies of water. The crops are influenced by like causes and do not suffer from drought to same degree as on the mainlands. Though these lands have been cultivated from the first settlement of the country—one year in corn and the next in oats, except the portions devoted to “trucking”—they still produce good crops of these staples, and seem practically inexhaustible. They are renovated in some degree, and in some instances a good deal, by the use of burned oyster shells, refuse oysters, and refuse fish spread over the lands (and by commercial fertilizers the trucking crops are raised), and by the “Magothy bay bean,” which comes up spontaneously after the oat crop. The other great advantages of these counties are their easy and inexpensive cultivation, and their cheap access to market, which are, indeed, very important factors to an agricultural community. One horse (without shoeing) and plow will cultivate this land sufficiently, and there is scarcely a foot of land which is not arable. Vessels trading to this section frequently purchase the crop in the field, harvest and remove it at their own expense, and transport it to the different markets. Besides raising the ordinary staples, except wheat, which is only partially cultivated, great

quantities of early vegetables are raised for northern markets, including sweet potatoes of the best quality. Fruits, including figs (the bushes being not often killed in winter), are abundant, the peach generally escaping the frost. The living in this section is very cheap—the waters furnishing a large quantity of fish, oysters and duck. One very great advantage of these counties, and, indeed, of all this section, is the rapid and cheap access to the markets of the world. Norfolk (including Portsmouth) is the chief commercial emporium of most of this region, though much is sent directly to the northern markets. An objection has been made to this region on the score of health, but it has been much slandered in this respect, as we shall show in another place.

We have received the following interesting statement, written in 1877 by an inhabitant of Tidewater, which we insert, as most of it is applicable to a large portion of Tidewater :

ADVANTAGES OF LOCATION IN SOUTHEASTERN VIRGINIA.

“Immediately after the close of the war a number of northern men purchased farms in Nansemond and the adjoining counties in Virginia. The salubrity of our climate, combined with the cheapness and productiveness of our lands, induced these first settlers to make favorable reports to their friends at home, from which the stream of immigrants from the Northern States has been constantly increasing. Nature has done more for Virginia than for any other State of the Union. She only requires the sturdy hand of industry applied to the development of her natural resources to place her in the front rank in material wealth. The southeastern tier of counties offers some of the finest farming lands in the State. There are many large estates here which could be conveniently divided into small farms, and thus present excellent locations for small colonies. Many of the lands here have been cultivated year after year without rotation or fertilizers, and it is a matter of astonishment to strangers that they have any productive power left. But they have a wonderfully recuperative power, which is most clearly manifested by a year or two of judicious and intelligent farming. The general character of the soils is a sandy loam, with clay subsoil. Marl, exceeding rich in lime, abounds throughout this entire section. As a permanent and cheap fertilizer it has no superior, and lies so near the surface that it is made available at trifling cost. We do not claim that these lands are equal in fertility to the virgin soils of the far west ; but, with the facilities of reaching the different markets of the country and the very small cost of cultivation, we do claim, without fear of successful contradiction, that farming can be made as remunerative here as upon the western prairie lands. Add to this the advantage of locating in a commu-

nity with a thoroughly organized society, a good school system in operation, churches in every neighborhood, and a climate in which the rigors of northern and western winters are unknown, and the intending immigrant can have little hesitation in choosing between Virginia and the west.

SUFFOLK,

The county seat of Nansemond county, is a thriving, beautiful town of 2,000 inhabitants, and is making rapid improvement. It is situated at the head of navigation on the Nansemond river, and vessels drawing twelve feet load at our wharves. It is thirty-five miles from Norfolk by water and twenty miles by rail. A steamer carrying passengers and freight plies regularly on the river between Suffolk and Norfolk.

CHURCHES.

The Baptist, Methodist, Christian, Episcopal, and Presbyterian churches are represented in the town and county. Churches of different denominations are thickly dotted over the county.

SCHOOLS.

The public schools extend over the State. They are annually increasing in efficiency. Beside the public schools, there are many private schools of high grade. In the town of Suffolk, the Suffolk Collegiate Institute (for both sexes) and the Suffolk Female Seminary offer superior educational advantages, and at very moderate charges.

LABOR.

Agricultural labor is supplied chiefly by the negro, and he has no superior as a farm laborer. In some instances white labor is employed. "Is not the negro idle, thriftless and thievish?" Do not judge a whole class of people by a few street-corner or cross-road loungers. He is to some extent superstitious, but we will do him the justice to say that, in Virginia at least, he is making improvement in morality and industry, and that the charge of larceny is a very rare thing in our criminal records. In fact, we can safely challenge a comparison of our criminal records with any community in the country. A more law-abiding and peaceable people cannot be found anywhere. The price of farm labor varies according to work required—from \$8 to \$12 per month and rations.

CROPS.

Corn is one of the staple crops for home consumption, every farmer seeking to make enough for his own use and to feed his stock. Corn

clover is one of the chief forage crops, many preferring it to the best timothy hay. We doubt its economy. Lands which have been well cultivated and cared for will produce forty to sixty bushels of corn to the acre, and in some exceptional cases more than this.

Oats is also a staple crop for forage. They are generally sown without fertilizing and fed in the sheaf. These will make from 2,000 pounds to 4,000 pounds to the acre.

Wheat has not been much cultivated as a market crop. In late years northern men who have settled here have made it a regular crop, and, with lands which they have improved, some of them have told us their crops would run from fifteen to thirty bushels to the acre. We confidently believe that most of our soils, with proper care, would produce wheat and other grain crops abundantly. The success which has attended its cultivation by our northern settlers has stimulated others to cultivate it, and they have been quite successful.

Clover grows luxuriantly on most of our lands. It is receiving more attention every year, not only as a forage crop, but as a permanent improver of the soil. It is often accompanied with timothy, which soon supplants the clover, and itself makes a vigorous growth of excellent quality. We have known more than two tons to the acre from first cutting, and worth on the field \$15 per ton. Of course a good growth of clover or grass of other varieties is apt to be accompanied by stock. Our people are giving more attention to stock than formerly. Some have introduced improved breeds of cattle, sheep and hogs. Devon and Jersey cows succeed admirably, and prove very remunerative. Southdown and other small breeds of sheep seem better adapted to our locality. Hogs of all kinds do well. Many of our farms furnish superior opportunities for successful and profitable stock raising.

Cotton is considerably cultivated, particularly at points somewhat remote from lines of transportation. Our growing seasons are so long that the plant attains great perfection. The yield is from three to five hundred pounds of lint per acre.

Peanuts (the Virginia variety) find in Nansemond and the four or five counties immediately west of it their peculiar home. These few counties enjoy almost a monopoly of the ground-pea or goober. Unlike the North Carolina, Tennessee or African nut, it is used almost exclusively for eating purposes. An average crop is twenty to thirty bushels per acre, though in many instances it exceeds this. We have known as many as 50 bushels, and some of our best farmers are never content with less than fifty bushels. The vine is used for forage, and is very nutritious. The crop is somewhat more expensive than corn, but they command con-

siderably more money, being worth now about \$1.25 for good quality, while corn is commanding from sixty to seventy cents per bushel.

Potatoes—both Irish and sweet—attain here their greatest perfection, and yield as abundantly as anywhere. They are extensively cultivated for shipment to northern markets. The fame of the “Nansemond sweet potato” extends throughout the country.

Vegetables of all varieties are grown in great profusion for shipment north. Our facilities for reaching the northern markets have made this and the country around Norfolk the great garden spot of the country.

Fruits in great variety and profusion are found in all this region. The apple, pear, peach, plum, grape, fig, and nearly all the varieties of small fruits, are found here in their perfection.

FISH, GAME, &C.

Our salt-water rivers give us an abundant supply of oysters, crabs and fish, all in their proper season. Many of the river farms have water-fronts which the owners esteem of more value than their arable lands, on account of the oyster-grounds and fishing privileges. In our forests the deer, hare, wild turkey and other game are found. The wild duck and wild goose are also caught on our waters.

TIMBER, WOOD, &C.

Nearly every farm has an abundant supply of timber, not only for farm purposes, but for market. Thousand of cords of wood and millions of feet of building lumber are annually shipped from our wharves. On many of the farms which we offer for sale, there is wood and timber sufficient to pay for the land, and leave an ample supply for farm purposes. Most of our farm buildings are of wood. The saw-mills located throughout this section furnish lumber of excellent quality in any quantity desired, and at prices from \$10 to \$20 per 1,000. A bill of good lumber for dwelling-houses can be bought now at about \$15 per 1,000 feet. Brick of good quality are made here and command \$10 to \$12 per 1,000. Building lime \$1.75 to \$2.00 per barrel. Agricultural lime of the best quality made from oyster shells, can be bought at the kilns in Suffolk at about \$3.50 per ton.

WATER.

There are many springs of clear, cold water, all through this section; but good soft drinking water can be obtained in almost any locality by sinking wells from twenty to forty feet. In many cases the water will be impregnated with alum, sulphur or iron, or with all combined, while in the immediate vicinity a well or spring of entirely different character will be

found. There are several mineral springs of superior medicinal properties in this county, whose efficacy upon northern invalids has been tested with the most favorable results. In fact as a winter home for northern invalids Suffolk and its vicinity offer superior inducements. Our winter climate is very pleasant, the thermometer seldom going below 20°, while the temperature in mid-summer is seldom above 92°. Even these extremes are rarely reached. There are very few days during winter when ploughing or any other farm work cannot be done. Fruit blooms appear regularly in March, sometimes in February. Our summer suns are not warmer than those of New York, Pennsylvania or Ohio.

HEALTH.

The health of this county will compare most favorably with that of any other section. Our climate seems peculiarly adapted to the prolongation of human life. Brónchial and pulmonary complaints, so common in the north, are very rare here. The location is a happy mean between the extremes of heat and cold. Malignant fevers, of a typhoid character, are seldom heard of here.

THE DISMAL SWAMP.

As many of our correspondents seem to dread the proximity of the Dismal Swamp (a portion of which is included within our county), we wish to say, in all candor, that it is a bugbear only. The character of this great body of land is little understood abroad. Its surface is higher than the surrounding country, as the water drains from it to the rivers on either side. It is a vast timber region, in which hundreds of men are working annually, and we challenge any section to show a class of working people in the enjoyment of more vigorous health. Chills and fever or billious fever are things unknown in the great swamp. In further proof of its healthfulness we cite the fact that vessels leaving Norfolk on a long cruise take their supplies of water from Lake Drummond, in the Dismal Swamp. It keeps perfectly free from impurities or stagnation, and will be pure and sweet for years.

PREJUDICE AGAINST NORTHERN MEN.

We have been asked whether northern men do not have to live down prejudice before they are received into good society. We answer, no. There is no prejudice against northern men. Let the hundreds now here attest it. Old Virginia hospitality has never been surpassed on the earth, and we now in our poverty give the stranger as cordial a welcome and as hearty a greeting, though not as bountiful as when our fathers welcomed your fathers to their princely boards."

We come now to say something of the advantages of *middle Virginia*, which extends from the head of "tidewater" to the "Piedmont country" (which embraces the counties lying along the eastern base of the Blue Ridge, and from the Potomac to the North Carolina line). It consists of twenty-five counties, which are sometimes spoken of as the northside and southside counties, having reference to their relation to James river, which passes through it from west to east. It has a population of thirty to the square mile, while England and Ireland have more than 250 to the square mile, showing an abundance of room for those seeking new homes. In this portion of the State, on the south side of James river, the larger portion of English settlers who have come to Virginia since the war have located, and in the Potomac counties of Middle Virginia a large number of northern settlers have, by their industry and skill, established valuable farms, and proved the great adaptation of this region to wheat, corn, grass and stock raising, and to all the fruits of the temperate zone. This region has an equable climate, is noted for its health, being, all things considered, the healthiest portion of the State, is particularly adapted to sheep-husbandry and general stock raising, is intersected by numerous streams, fed by never-failing springs of the best water, which render it one of the best watered countries on the globe. This *middle country* is a great undulating plain, triangular in shape, bordering to the south on North Carolina for about 120 miles, on the Potomac twenty-five miles on the north, 216 miles on the Piedmont counties on the west, and 174 miles on tidewater on the east. There are no abrupt uprisings, but a gradual elevation from its eastern border to its northwestern, until it attains a height of 300 to 500 feet above tide.

The bottom lands bordering the numerous streams are always rich. Some of the high lands are poor, but very susceptible of improvement, but "feldspar" rocks, in combination with hornblende and iron pyrites, exist in many places, which, by gradual decomposition, furnish potash to the soil, and constitute red soils, which are productive and capable of being made, by proper management, very rich. The "green spring" country in Louisa county (middle Virginia), is noted for its fertility, and geologists tell us that this has been produced by the weathering and decomposition of the minerals of this section, such as chloritic *gneiss* (containing potash), serpentine, steatite, &c. One of our correspondents, Mr. William Holman, of Cumberland, a very intelligent farmer, speaking of the lands of his county, says they are so adapted to the growth of clover that he has more than once seen fields well set in clover, in a natural way, without being seeded. Many of the lands of this and the adjoining counties lie on an excellent clay subsoil.

While "middle Virginia" is not generally considered a grass country, much of it, by moderate improvement, will produce good growths of clover, orchard and other grasses, and the natural grasses are sufficient in many places for pasturing large flocks of sheep. This is a great *fruit* region, particularly the northern tier of counties. The "southside counties," with some of the northern ones of this section, constitute the famous *tobacco* region of Virginia, and raise more than fifty millions pounds annually of tobacco. The southside counties have the advantage of later falls, the frost being longer deferred, giving more time for maturing the plant—in some seasons a very important thing. Through middle Virginia are sections of land known by geologists as the *triassic* and *jurassic* formations, which, from the production of cigar tobacco in analogous formations in other States, and some experiments, are believed particularly adapted to the growth of cigar tobacco. These sections of land are found in Pittsylvania, upper part of Halifax, a small portion in Prince Edward, Cumberland and Buckingham (the dividing line of the two last passing through this formation), Chesterfield and Henrico (the coal region), a small portion in Hanover (where coal has recently been found), Orange (small), Culpeper, Fauquier, Prince William, Fairfax and Loudon—the larger portion of this land being found in the last named five counties. This may be an important matter in the agriculture of the State, and for further information on the subject reference is made to John Ott, Esq., secretary Southern Fertilizing Company, Richmond, who has prepared an article on the subject, and to whom is due the credit of first making this suggestion to the planters of Virginia.

Middle Virginia, if not the most important mineral region in the State, is very prominent in this respect, containing a great variety of the most valuable minerals, agricultural and architectural, iron, coal, the precious metals, copper, slate, mica, plumbago, with others. A more special notice will be taken of these minerals in another place. The great *gold* belt passes through this region from the Potomac to near the North Carolina line.

The timbers of this region are extensive and valuable, about half the country being woodland. Situated partly in this section and partly in Tidewater are the cities of Petersburg, Manchester, Richmond, Fredericksburg and Alexandria. Besides these this country contains Lynchburg, sometimes classed as a Piedmont city (but it would seem improperly so, as it is in Campbell, which belongs to middle Virginia), Farmville, and Danville, all important tobacco markets, containing active, intelligent and industrious populations. Danville is one of the most rapidly increasing cities in the state, and a great tobacco mart.

The section of country we are considering has very available outlets for its produce. The northern section has water transportation through the Potomac, the middle counties through the James river and Kanawha canal,

and some of the southern counties through the Roanoke and Dan, besides the eastern counties being furnished with communication through the Appomattox, James and Rappahannock. Besides these water communications this section has excellent railroad transportation through the Atlantic, Mississippi and Ohio, the Washington City, Virginia Midland and Great Southern, the Chesapeake and Ohio, the Richmond and Danville, the Fredericksburg and Charlottesville, and Manassas Gap railroads. Thus it would appear that there are few sections in Virginia, or elsewhere in the United States, better supplied with means of access to market. Besides these some of the southern counties have access to the Petersburg and Weldon railroad.

We come now to speak of *Piedmont* Virginia, which consists of fourteen counties situated at foot of the Blue Ridge mountains (as its name indicates), stretching 244 miles in length from the Potomac to the North Carolina line. Its width is generally that of a single county, usually averaging about twenty-five miles. To any one who has seen these counties it is unnecessary to speak in their praise. They contain little of what could be considered poor or unproductive land, unless it be portions which stretch up on the mountain sides, and are in some places covered with rock; but even these mountain sides are frequently very fertile to the summit, and very productive. These counties have an excellent chocolate soil, or a deep loamy one on the streams and mountain sides, very deep, and particularly adapted to wheat and grasses, and Irish potatoes, and stock raising. No other portion of the State is better adapted to rearing of stock, particularly horses and cows. The whole is intersected by water-courses, and abounds everywhere with the best, purest springs of cold water. It has a population of thirty-one to the square mile, and of course is capable of maintaining a much denser population, equal to that of England, with improved cultivation. It is rich in *iron* ores particularly, of the best quality. These ores, from their analysis, it is believed, will compare favorably with the best iron ores of Lake Superior and Europe, and are especially adapted to the manufacture of Bessemer steel and the best kinds of iron. It has the best brick clay, roofing slates, variegated marble and kaolin, and the epidote rocks, as in middle Virginia, the weathering and decay of which is constantly renewing its fertility. The magnetic ores have been found in almost all these counties. *Lead* has been mined in Nelson county, the ore yielding 52 per cent. of metallic lead and forty-five dollars worth of *silver* to the ton; and lead is also found in Franklin and other counties. *Manganese* is extensively mined in Nelson and Augusta.

This is one of the best fruit regions in the State, and extensive orchards of apples, particularly, have been established, which have been found very profitable. Through this section, also, are many vineyards, and a large

variety of grapes succeed admirably, and this interest is rapidly increasing and promises to be very important. For an account of the fruit-producing capacity of Piedmont and the upper portions of middle Virginia, tributary to the Virginia Midland and Great Southern railroad, and of the orchards and vineyards which have been established through this region, reference is made to a very interesting "report of the resources of Virginia, and particularly of the counties tributary to the Washington City, Virginia Midland and Great Southern railway, John S. Barbour, president," by Dr. James C. Hill; also to a report of W. W. Minor, Jr., to the "Keswick Farmers' Club," of Albemarle, showing the profits of grape culture in that county—(January number of *Southern Planter*). The access to market available to *Piedmont* Virginia, is excellent, and is by the railway just referred to, the Atlantic, Mississippi and Ohio, the Chesapeake and Ohio, the Manassas Gap, and the Washington and Ohio railroad, and the James River and Kanawha canal, probably soon to be superseded by a great railroad.

The towns in this section are Liberty, Charlottesville, Culpeper, Warrenton, Gordonsville and Leesburg. *Piedmont* Virginia is considered by many as the healthiest portion of the State. We have, in speaking of *middle* Virginia, expressed the opinion that this section carries off the palm in this respect. We think, as we have said, that with all the blessings a beneficent Creator has endowed our State, there are compensating advantages claimable by each section, and it would be hard to say which has the most advantages. We accord to the splendid *Piedmont* country, and to the magnificent *Valley*, their due meed of praise, and acknowledge that public opinion sets much in their favor, as evidenced by the high price which their lands command, but we cannot accord to them superiority in everything to *Tide-water* and *middle* Virginia. While "westward the star of empire takes its way," there is too much disposition to forsake older settled countries for newer ones. And, just here we remark that the two last sections have great advantages in nearness to market, earlier springs and later falls, long summers and milder winters, and better roads than other sections of the State.

The *Blue Ridge* region, which, for most of its length, is occupied by *Piedmont* counties on one side and the *Valley* counties on the other, as it nears its southwestern limit in Virginia, spreads out into a plateau, embracing the counties of Floyd, Carroll and Grayson, containing 1,230 square miles, is naturally a separate, *political* division. So, too, is *Appalachia*, lying just west of the *great Valley*, which, indeed, embraces a part of *Appalachia*, some of its counties, running into this mountain region. For want of space, and from similarity of soils, climate and productions, we will consider the advantages of these sections in conjunction with the *great*

Valley region of Virginia. *Appalachia* proper embraces the counties of Highland, Bath, Alleghany, Craig, Giles, Bland, Tazewell, Russell, Scott, Lee, Buchanan and Wise, and lies west of the *great Valley*, and is traversed by the Appalachian, or Alleghany system of mountains, the country consisting of a succession of valleys and narrow mountain ranges, the valleys being generally very fertile.

The *Valley of Virginia* lies between the Blue Ridge and the Alleghany systems, some of its counties ranging into each chain of mountains, and Augusta, Shenandoah, Rockingham and Frederick, taking up a considerable portion of the Appalachian division. The *Valley of Virginia* comprises fifteen counties, viz: Frederick, Clarke, Warren, Shenandoah, Page, Rockingham, Augusta, Rockbridge, Botetourt, Roanoke, Montgomery, Pulaski, Wythe, Smyth and Washington, and is subdivided by five streams, which cross it, constituting five distinct valleys. It has a population of twenty-six to the square mile. The fertility of all this region is proverbial, and to those who have visited it, a word in its commendation would be unnecessary; and its beauty is equal to its fertility. Nature has done as much for it as probably any region in the world, and the excellent farmers who inhabit it have not been remiss in improving its advantages. England is the country we are prone to set up as the agricultural standard with which to compare other favored regions. It has been the writer's fortune to traverse England from the Tweed to Isle of Wight, and from Holyhead to Dover and Harwich, and to examine some of the finest farms in this favored country, and he is free to state, as his opinion, that nature has favored no part of England more highly than the *Valley of Virginia*, and, indeed, it is probable, that the natural fertility of this latter region is greater than any portion of the former. Like other portions of Virginia, it is traversed by numerous streams, which, in many places, give it a good water-power, afford abundant supplies of water for irrigation and for stock-raising. It is an admirable grass country and eminently adapted to raising stock of all kinds, and we find grazing and stock-raising extensive and profitable in this section of the State, and that nowhere is finer stock produced. Natural grasses spring up all over these sections, and the "blue grass," noted for its nutritious qualities, prevails through the three regions we are speaking of, as well as *Piedmont region*. The *minerals* of the regions we are considering—*Blue Ridge*, the *Valley* and *Appalachia*—are very numerous and valuable. In the first are copper, in large quantities, iron ores of almost all the varieties, and in abundant quantity, green-stone, manganese, brick and fire clay. In the second, limestone, to which is probably due much of the fertility of the lands, valuable marbles, slates, brick and fire clay, some anthracite coal, iron ores, large quantities of lead and zinc, barytes, kaolin, &c. In the third, limestones, marbles, slates, brick and fire clay, different

valuable iron ores, gypsum, and salt (in Washington, Smyth, Tazewell and Lee,) with all the varieties of bituminous coal in good quality. The towns of the Valley are Abingdon, Salem, Wytheville, Harrisonburg, Lexington, Winchester and Staunton—all flourishing places. The access to market for these regions is by the Atlantic, Mississippi and Ohio railroad, on south-side of James river, which strikes the Valley twenty-four miles north of Salem, the James river and Kanawha canal, entering at Buchanan, the Chesapeake and Ohio railroad passing through Staunton, the Valley railroad from Staunton to Harper's Ferry, designed to be carried to Salem, and Manassas Gap, running from Virginia Midland to Strasburg in Warren county.

HEALTH OF VIRGINIA.

The general average health of this State is undoubtedly good. This is universally conceded for Middle Virginia, which has all the requisites to constitute a healthy country—equable temperature, rolling, well-drained country, and excellent waters. By the table referred to in Major Hotchkiss' "Summary," prepared from meteorological tables of the "Smithsonian Institute," we find the mean temperature in 1869-70 for autumn 54.1, and winter 38.5; and in 1870-71, the mean temperature for spring 54.2, for summer 75.5, for autumn 57.8, and for winter 36.5—the annual mean for the two years being 55.9—the highest temperature in the two years being 93 in June, and the lowest being 8 in February, 1870, and 8 in December, 1871. It is rare that we have the temperature in this region higher in summer than 90, and lower in winter than 5 or 8, rarely reaching zero, and these extremes are usually of short duration. This section of the State is removed from the malarial influences of tide-water, except occasionally in the lower tier of counties, and from the colder and comparatively damper climate of the Piedmont, Valley and mountain regions. The diseases that prevail in middle Virginia are rarely such as are supposed to be of any local origin or climatic influence, but, as it were, of accidental occurrence, caused by improper exposure, imprudent dieting, or hereditary complications.

That the healthfulness of the Piedmont, and the Valley and the mountain regions is accepted in popular estimation, is attested by the number of persons who seek all this region in search of health, from the south, and the north, and the west, and even Europe, in the summer and early fall months. In the winter the minimum of cold is lower than in the other divisions of Virginia, and the climate damper, with longer winters, and more protection and warmer clothing is required than in the other portions of the State. But we find this region inhabited by a very hardy race—robust, ruddy, and long-lived.

It remains to speak of the health of Tidewater, which, as we have said, has suffered unduly in popular estimation on account of *malaria*, which prevails there in some seasons. We say some, because frequently for years—four or five—none occurs, and in one instance for ten years, viz: from 1832 to 1842, as we were informed by that widely-known physician, the late Dr. Henry Curtis, of the lower end of Hanover county, no malarial disease (intermittent or remittent fever) prevailed in Tidewater Virginia. When it exists it is not usually for a longer period than a month or six weeks, generally from first of September until frost, which often occurs by 10th October. In more unfavorable seasons it may be prolonged for eight weeks. *Having practiced medicine in Tidewater for ten years I do not hesitate to express the opinion that the gravity of ague and fever and billious fever is much overestimated.* These ten years happened to be a period in which these diseases prevailed quite frequently, and in some of the years quite extensively. One prominent reason I give for the opinion just expressed is, that these diseases (or this disease, for they are one) have such a sure antidote in quinine, if properly used, and another is that they are seldom fatal, being of a mild type.

Their congestive form is little seen in Virginia. Even before the use of quinine they were rarely fatal. Having been raised on a farm in this section of the State, with a large white and black family, and under the old regime of "Peruvian bark," it is a well ascertained fact, in the history of the family, that there was not more than one, possibly two deaths, from this disease in the course of thirty years. With quinine there would probably have been none. In the period of practice (ten years) just alluded to, it was my fortune to see but one death from malarial disease, and that occurred in a congestive form, in a constitution greatly impaired by drink. Then, it is, in many instances, a preventable disease, particularly by the avoidance of night air and improper exposure. Some years before the war, a gentleman of South Carolina, against the persuasion of his friends, purchased a plantation near the coast, for the purpose of raising cotton, the place having a reputation of being very sickly. After a series of years, he gave his experience, which was published in one of the medical journals. He enforced strict orders, that none of his hands, or his family should go out until after sunrise, and should come in at sunset, during the sickly period, and his report was that there was almost entire immunity from ague and billious fever. The affection is, of course, very objectionable, and particularly so, if the habit is permitted to be formed, but it may almost always be prevented by timely use of quinine, not permitting even a second chill, and a few grains (five or six) daily, afterwards, thought to have much effect in preventing a recurrence. A prominent farmer, on lower James river, believed that he had kept off the affection

for twenty years by the daily morning use of two grains during August and September. This malarial disease avoided, and *Tidewater Virginia* is in other respects probably the healthiest portion of the State. The mean winter temperature of this section is four or five degrees higher than the valley and mountain regions, and consequently it suffers less from diseases incident to colder and damper climates, viz: rheumatism and lung diseases. Typhoid fever is decidedly less frequent in *Tidewater* than the other portions of the State, and it is a fact that malarial regions suffer less from typhoid fever than non-malarial. Up to 1851 typhoid fever was, to my personal observation, scarcely known in *Tidewater*, and now, when it occurs, medical men consider it of milder type than that occurring in mountain regions. Another fact may be mentioned, and medical men generally consider it a fact, that ague and billious fever is less frequent than formerly, owing, it is believed, to the use of marl and lime and drainage in this section. Another observation, bearing on this point, is that statistics prove Richmond one of the healthiest cities in the Union, and Richmond is in the malarial region, for when these diseases prevail in *Tidewater*, Richmond is not exempt, and suffers nearly as much in the proportion that the counties around her do. We think, if the facts could be known, that no more mortality, and as much longevity, would be found in *Tidewater* as in the mountainous regions of Virginia.

I am fully aware that Middle Virginia and the Valley and mountain regions can take care of themselves on the score of health, in the estimation of the public, and have considered it my duty to disabuse the public mind, as far as lay in my power, in reference to opinions unfavorable to the health of *Tidewater*.

GENERAL REMARKS ON THE RESOURCES OF VIRGINIA.

When our writers and speakers descant on the resources of the State, we are twitted with the question, why don't you develop them and make them practical and manifest to the world? Virginia has always devoted her time and capital to agriculture, and it must be admitted has been too content to tread along the old, beaten path in an easy, quiet way, and has not developed her agriculture and other resources as have other States. Her capital being employed in agriculture, there has been little left to devote to manufactures, mining, and extending her railroad lines to the wealthy cities and regions of the great and dominant (or is to be) west. Then Virginia has, for many years past, been the maker of presidents (as Warwick was the maker of kings), and has been content to devote her energies and time (which is money) to politics and theories of government, and to presidential successions.

So the time is past, but the *resources* nevertheless exist in the State, as time and opportunity and capital will one day prove.

Bearing on this subject, I do not know that I can do better than to quote from my "First Annual Report" (the copies of which are now exhausted), the following paragraphs, to the truth of every sentence of which I am ready to vouch:

If we consider the climate, it is unsurpassed in the United States, except on the Pacific slope; if the health, there is no State east of the Rocky mountains that can lay claim to better general health; if the productions, we can raise everything from cotton and the fig in our southern border to the most varied productions of colder climates on our northern limits; if the mineral resources, we have everything valuable that can be found in almost any part of the world—coal, bituminous and semi-bituminous, in great abundance, and anthracite in moderate quantity; iron, an inexhaustible supply, and of the best varieties—gold,* copper, lead, zinc, silver, granite, limestone, marble, plumbago, manganese, glass sand, brick and fire clays, salt, gypsum, &c., and in Tidewater Virginia extensive deposits of marl (white, red and green-sand variety), very valuable for fertilizing purposes; or the streams and water-power, and facilities for manufacturing we find valuable streams in all portions of the State, irrigating the country, affording navigation, abounding in fish, and furnishing numerous excellent sites for manufacturing purposes, which, added to the cheap and abundant fuel, and the coal and the iron, make our State one of the most favored in the world for manufactures; or the railroads and navigable streams, affording access to markets, we are highly favored, for the country is intersected with well constructed railroads, and the eastern portion by numerous large navigable rivers, which, together with our nearness to the Atlantic, enable our farmers to put, at small expense, their products on the markets of the world; or the advantages nature has given us in health-giving fountains and attractive scenery and beauty of country, our mineral springs are numerous and of great reputation in curing diseases, and the landscape in our mountain regions and on our rivers, and on our bay and ocean front are of great variety, and of great beauty; or the educational advantages of Virginia, few States are better equipped in this respect; our common school system is admitted to be an excellent one, presided over by a gentleman universally acknowledged to be admirably qualified for the position, and who is leaving "no stone unturned" to make it efficient, and our collegiate institutions, including our noble "University," are a pride to the State; or our religious advantages, with religious liberty, which are among

* From these mines more than a million and a half of gold had reached the United States mint up to 1871—HOTCHKISS. Practical miners say that these mines would yield as well as those of California if worked with like skill and capital.

crowning glories of the Old Dominion—every denomination is represented by able, good men, and our churches are numerous and efficient, long not in emulation and contention to seek worldly applause and make proselytes, the one from the other, but to do good and elevate and christianize their fellow-men; or our social advantages of which Virginians speak in no empty boast but with a cordial right hand extended to all worthy immigrants who seek homes amongst us; if we consider these things are we not “resources” of which any State or nation might rightfully boast?

To speak more in detail of all these resources, and first of our *climate*, with some general remarks on the topography of the State:

Virginia occupies a position *midway* in the States from North to South from Maine to Florida—and in the line of the central States reckoning from East to West, giving it emphatically a climate of *means*.

Virginia, occupying this midway position among the States of the Union, favored by a “mean” climate; removed from the “frozen” climate of Northern States, and the enervating temperature of our southern neighbors. The *Gazette* of Virginia, published by “Martin,” puts the mean climate of Virginia at 55°. Mr. Jefferson, in observations made at Williamsburg (Notes of Virginia), from 1772 to 1777, a period of five years, takes the mean temperature of that locality at 60°, the highest mean temperature in any month being 82½° for August, and the lowest mean temperature for any month being 38½° for January. Observations made for a period of five years in Louisa county, from 1823 to 1828, make the mean temperature 59½°, (made by Mr. David Watson, Martin’s *Gazetteer*). Major Schkiss, in his “Summary of Virginia,” gives a table “presenting the *maximum* and *minimum* and the *mean* for each month of two years, from spring of 1869, inclusive, to that of 1871, for ten stations in different sections of the State, grouped in seasons, with the means for the seasons of the years.” From this it appears that the mean temperature for the State in 1869–70 was 56°, and for 1870–71, 56°. Of course the mean temperature is lower for the mountain and Piedmont region than for Middle Virginia and Tidewater Virginia; but the difference is not as much as would be supposed. For those desiring more detailed information on this point, reference is made to this table. The practical point in regard to the climate of Virginia in relation to agricultural production is, that our winters are in general mild enough to do a great deal of work on farms at this season; that our wheat, and oats, and grasses, and fruit trees, are frequently extending their roots in the soil in mild spells in winter, and strengthening themselves for early spring growth; that stock requires much less housing and feeding than in sections further north; that our summers are long enough to mature almost all crops that will grow else-

where; and the climate, together with the soil, is such that the most varied productions can be raised—all the productions of cool and warm temperate climates. Corn, wheat, oats, tobacco of all grades, clover, and all the grasses, and cotton on our southern border, all the fruits, except those of the tropical region, vegetables of all kinds in great abundance, peanuts (an important crop in Tidewater Virginia), with a variety of other things, flourish in Virginia. Commodore Maury, good authority, says: "Everything which can be cultivated in France, Germany, or England, may be grown here equally as well, with other things besides, such as Indian corn, cotton, tobacco, peanuts, broom corn, and sweet potatoes, &c., which are not known as staples there. The climate and soil of Virginia are favorable to the cultivation of the grape and manufacture of wine, as they are in France and Germany." The different portions of Virginia have their peculiar advantages, which often counterbalance one another.

PRODUCTION.

The productions of Virginia have already been presented in some detail in commenting on the advantages of the different sections of the State. The climate and soils of Virginia favor the growth of nearly all of the useful and profitable productions of the world. Wheat, oats, rye, buckwheat, and Indian corn, the great sustainers of animal life, are raised in immense quantities. It is the native home of tobacco, that valuable staple from which large sums are annually realized by the planters, and by the general government in the shape of very unjust internal revenue taxes. In the southeastern section, cotton is profitably grown, and in all parts of the State the cultivated grasses are successfully grown, and in much of it the native grasses make the finest grazing. Our short winter season and mild climate give us great advantages in rearing all kinds of domestic animals. Sheep do well in all parts of the State, and is one of the most profitable items in farm economy.

The crops of 1859 (census of 1860) deducting for counties now in West Virginia, were: Of wheat, 10,848,400 bushels; of rye, 670,052 bushels; of Indian corn, 30,361,352 bushels; of buckwheat, 135,549 bushels; of oats, 8,537,630 bushels; of hay, 235,997 tons; of cotton,* 5,054,800 pounds, of which Tidewater produced 4,104,800 pounds; of tobacco, 121,787,646 pounds (about one-third of the crop of the United States); Irish potatoes, 1,542,892 bushels; sweet potatoes, 1,892,776 bushels; peas and beans, 482,836 bushels; value of orchard products, \$566,377; of market gardens, \$540,468. The last figures give a very inadequate showing of the present

* The cotton crop now is estimated at eleven to twelve millions of pounds.

amount of the gardening business. In 1872 the shipment from Norfolk alone, from *trucking*, as it is called, was estimated at \$1,500,000. The peanut crop is probably worth \$1,000,000.

The maple-sugar crop in 1859 is put down at 271,161 pounds, with 27,924 gallons of molasses, and 46,434 gallons of sorghum molasses.

In enumerating the productions of the different counties of the State, we gave the number of farm animals as obtained from the report of the Auditor of Public Accounts for 1877.

The value of the stock of the State in 1859 is placed at \$35,419,809. The horses and mules in Virginia have always been noted for their excellent qualities, and many of them for their good breeding. They can be raised in *Piedmont* and the *Valley* as cheaply as almost anywhere else, and in *Middle* and *Tidewater*, also, their rearing is not expensive, the winters being mild, and the grazing sufficient to dispense with much grain-feeding. Some of the best-bred horses and finest racers have been produced in these latter portions of Virginia.

Butter and cheese may be produced as cheaply in Virginia as in almost any other portion of the world, though these products do not receive the attention they deserve. In 1859, the number of cows to each 100 people was twenty in Virginia, and twenty-seven for the whole Union, the number being 230,659 (Hotchkiss).

Work oxen are much used in the State, particularly in *Tidewater* and *Middle*, and are found very useful and cheap. Their number, by the census of 1860, was 89,103. The *swine*, by this census, numbered 1,262,707, which was 1-24 of all the hogs in the United States, and an average of 103 to each 100 persons, and in the United States, 106 to each 100, while in New England there was only ten, and in Great Britain, in 1874, only nine and one-third to 100 persons (Hotchkiss). Hogs are cheaply raised in many parts of the State, particularly where "mast," acorns and chestnuts and beechnuts abound.

Bees do remarkably well in Virginia, on account of the long summer and mild winters, with moderate rain-fall, and the abundance of wild flowers and clovers, cultivated and uncultivated; white clover, the richest honey producer, is indigenous in all parts of the State. The production of honey in 1859 was upwards of a million of pounds, and wax 75,000 pounds, which was one twenty-third of the entire honey crop of the Union. Some of our correspondents speak enthusiastically of bees, particularly Mr. E. C. Jordan, of "Jordan's White Sulphur Springs." He says "he has one of the finest 'apiaries' in Virginia, and ships his honey to all the northern cities. He prefers the Longstroth's hive to all others. Bee-raising is prosecuted successfully in many of the *Valley* counties.

Wild fruits abound in all sections of the State, as blackberries, straw-

berries, whortleberries, persimmons, plums, and cherries, and cranberries; and various nuts, walnuts, hickorynuts, chestnuts and filberts, are plentiful in many portions.

It is to be regretted we have not statisticts of our productions to a later day. The census of 1870 gives us a very uncertain guide as a means of comparison with 1860, as an exhibit of the increase or decrease of our productions. This census, 1870, gives our winter wheat 7,391,398 bushels, and corn crop 17,649,394 bushels, while that of 1860 gives us nearly 11,000,000 bushels of wheat, and upwards of 30,000,000 bushels of corn, *excluding* West Virginia. Again, the tobacco crop in 1870 is placed at only a little more than 37,000,000 pounds, while our tobacco in 1860 was more than 130,000,000 for Virginia and West Virginia. In Richmond, in 1870, was inspected more than 45,000,000 pounds. Major Hotchkiss, in his Summary, quotes from the report of the Agricultural Department, United States, for 1869, which puts our wheat crop in 1869, 8,642,000 bushels; corn crop at 17,500,000 bushels; oats at 9,017,000 bushels; hay at 220,000 tons; tobacco at 65,000,000 pounds, which is probably an approximation to accuracy.

TIMBER OF VIRGINIA.

The timber and wood resources of the State are very great, and will be a source of much future value, as they have been in the past a means of valuable revenue. It is difficult to get any accurate account of the quantities remaining unused, but they are still very large, and for fuel purposes will last a great many years, for immense tracts have been tilled until they ceased to be productive, and been turned out to renew themselves by fresh growth, principally of pine and oak; first pine, and if that is removed, then by oak, and then again by pine, unless kept in cultivation—an example of “rotation of crops” adopted by nature. Wood for fuel is important, as well as for timber (not so much so), and to an European this economy is very attractive, of having a supply of fuel almost at the door, without buying it at a high price.

A great deal of timber has been cut from *Tidewater*, and much remains. The census of 1870 is notoriously imperfect, and on this account we have generally to refer to the census of 1860. By that the improved land in *Tidewater* is 2,034,399 acres; the wood land, 2,216,990. Sailing vessels being able to visit almost every portion of this section, great quantities of yellow pine, cypress, and oak lumber, staves, shingles, hoop-poles, cedar and locust posts, and fire-wood, besides railway ties, and other things made from timber, have been shipped to all parts of the United States, and have been a source of great value and must continue to be in the future. Chestnut, walnut and hickory timber also prevail in this section. The Dismal Swamp

embraced in this section, contains still a great supply of timber, principally cypress. The sales of lumber in Norfolk in 1871-72 aggregated \$2,000,000 (Hotchkiss). This did not all come from Virginia. In the year 1876, as we gather from an authentic statement in the Norfolk *Landmark*, there were exported from Norfolk, the shipping port of this region, \$234,727 value of staves alone, besides other timber.

Middle Virginia, by the census of 1860, contained 2,882,525 acres improved land, and 3,148,376 acres wood land. The timbers of this section are, pine of superior quality, great variety and abundance of oak wood, locust, chestnut, cedar, gum, persimmon, &c.; oak bark, sassafras bark, and sumac, in addition to a large quantity of timber, are exported from this section, and the trade could be easily increased with abundance of railway and canal transportation, and the Potomac on the north and the rivers on the south.

Piedmont has 1,951,427 acres improved, and 1,180,149 wood land. The same timbers prevail here as in the other sections, also pine and cedar, which are not so abundant, with the addition of black walnut, and large quantity of chestnut.

The *Blue Ridge* division has 152,567 acres improved, and 413,944 acres wood land. All kinds of oak, hickory, and chestnut prevail in large quantities in this region, and some yellow pine.

The *Valley* has 1,520,878 acres improved, against 1,810,512 wood land. This region is rich in the best timbers, including those mentioned in the other divisions (unless it be chestnut), and it is said to be of the best quality.

Apalachia, or the Alleghany region, has 539,913 acres improved, and 1,708,987 wood land.

The oaks, pine, (red and some white pine), poplar, walnut, birch, beech, locusts, cedar, sycamores and cherries, are found here. The difficulty of access to many portions of this and the Blue Ridge sections have prevented these timbers from being greatly utilized, but, in the progress of improvement in this direction, these timbers will be valuable, and in demand for a great variety of purposes. And it is fortunate, in view of the great future development of the iron of the State, that coaling timbers are found in juxtaposition to the extensive deposits of iron.

The Chesapeake and Ohio railroad, through General St. John, their "consulting engineer," has obtained some fine specimens of timbers from the lands in Virginia bordering their road—among them some very handsomely prepared pieces of curled walnut and curled poplar, which may be seen in the engineer's office in the city of Richmond, Broad street, near their depot.

The oak bark and sumac of Virginia promise to be very important and profitable articles of commerce for the State; though they seem small now, they will appear large hereafter, and add an important item to the almost innumerable resources of Virginia.

MANUFACTURES OF VIRGINIA.

We sent out upwards of 700 circulars in 1877, and more in 1878, asking information about the State, and received replies from less than one-half. Among the subjects inquired about were the manufactories established in each county. In the replies the numbers only were stated, generally without giving the kind of work done, or the capital employed, or the success of the enterprise.

During the existence of slavery the State was almost wholly an agricultural one, and all the capital of the people was invested in lands and negroes. The necessity of manufacturing is perceived now with great force, to convert our ores into metals, particularly the immense deposits of iron; these metals, in conjunction with our extensive, valuable timbers, into machinery; our yarns and cotton, so near our border, as well as that raised within the State, into clothing; to utilize our large supplies of the best oak bark in the establishment of extensive tanneries; to convert our iron into steel, and that into cutlery of all kinds, and to utilize our resources in every available way. Every manufactory gives employment to much labor that would be idle, and converts consumers into producers, and affords the best markets for the farmer's supplies.

Manufacturing is not greatly advanced in the State—is almost in its infancy, ideed, in comparison with what it should be; but, before the financial troubles, had been developing in a very satisfactory manner. Even before the war, in the time of slavery, there was more manufacturing than generally supposed. The census of 1860 gives the annual value of products of manufactures in Virginia at \$50,652,124.

The census for 1870 gives the products of manufacture for Virginia at \$38,364,322, the statistics of mining, quarrying, and fishing industry being excluded from these tables, while they are included in that of 1860, which would make a difference of probably eight or nine millions. The manufactures embrace a great variety of products, but the principal ones are those of flour and tobacco, iron, cotton, lumber (sawed), agricultural implements, and machinery.*

The statistics obtainable from the cities are more definite and of later dates. From the *Richmond Dispatch* of January 1, 1877, we find the

* The products are most for Tidewater, Richmond being included—rather less in amount for Middle, and nearly the same for Piedmont and the Valley, and only a small amount for Blue Ridge.

number of factories in Richmond city at that time to be 343; number of hands employed, 11,247; and the amount of sales, \$22,428,680. Of this amount, flour manufactured produced for 1876 \$2,083,000; iron and nail works, \$2,032,880; tobacco (chewing), \$10,585,900; chewing and smoking tobacco, \$1,472,400, and stemming, \$885,000; oak bark and sumac, \$250,000.

The manufactures of the city amounted in 1870 to \$7,000,000; in 1871, to \$14,840,146; in 1872, to \$16,199,870; in 1873, to \$14,881,136; in 1874, to \$17,746,720, and in 1876, to \$22,428,680, as just stated (*Richmond Dispatch*).

Some other statistics connected with the city we had as well speak of here: Lumber brought into the city in 1876, 4,675,443 feet; shingles, about 1,000,000, and laths, 383,600.

The exports from Richmond in 1875 were \$2,254,609, and in 1876, \$5,046,666—a good showing for the hard times.

The manufactures of the city did not decrease in quantity, but yielded one million less in 1876 than in 1875, on account of the fall in price of almost everything. The shipping made rapid advance, particularly in cotton, coal and petroleum. (Application has been made to the mayors of Fredericksburg, Lynchburg, Danville and Petersburg for statistics of their manufactures, but no replies have been made).

The following is from the *Dispatch* of January, 1878:

“The largest manufactories of Richmond are tobacco, flour and iron. For 1877, the sales of manufactured tobacco of all kinds were in round numbers, nine and a half millions; flour two and a half millions, and iron one and a half; agricultural implements nearly half a million.

“OUR MANUFACTURES.

“Our annual tabular statement of the manufactories of Richmond for 1877 show that the sales of their products amounted to \$21,966,397 against \$22,424,680 for 1876, or a falling off for the year 1877 of \$458,283. In the manufactured tobacco trade of all branches, the reduction foots up \$2,872,692 as compared with 1876, and in the iron trade, \$531,925. On the other hand, many of our manufactories show a largely improved business, notably in agricultural implements, bricks and other builders' materials, leather goods, cigars and cigarettes, clothing, cotton goods, flour, fertilizers, and all kinds of small wares, while nearly one thousand more hands have been employed than in 1876. The results of the year's work are encouraging in nearly all departments except in tobacco and iron.”

We give the following very encouraging exhibit of the manufactories of Richmond for 1878 (from the *Dispatch* of January 1, 1879), very encouraging in view of the financial pressure, which, even in England, is forcing many manufactories to close, or to curtail greatly their operations :

“OUR MANUFACTORIES.

“Our annual tabular statement of the manufactories of Richmond for 1878 shows 562 at work—an increase of thirty-nine. They employed 11,730 persons, or 263 less than in 1877, and their sales for 1878 amounted to \$17,951,050, or \$4,015,257 less than the preceding year. The heaviest loss is found in the manufactured tobacco trade of all branches, amounting to \$2,416,758 as compared with 1877. The remaining loss of \$1,598,499 is accounted for by the reduced prices of all the products of labor, for most of our factories show increased production during the year, while in many departments we were told of steady increasing orders. On the whole, our manufacturers generally (other than tobacco) seem encouraged by the result of the year’s work, and speak hopefully of the future. With the settlement of the tobacco-tax question by Congress we may expect to see our tobacco trade revive, and a buoyancy in all classes of business greater than for some years past.”

The same authority shows that Richmond has very nearly maintained its shipping commerce for 1878 (number of ships entering and leaving) as compared with 1877, while the exports for 1878 exceed those for 1877 by nearly \$700,000. The number of vessels engaged in the flour trade to Brazil has increased by the number of thirty-two, and the number of barrels of flour by more than 60,000.

The coal trade of Richmond is, by means of the Chesapeake and Ohio railroad, rapidly increasing. Over this road was shipped for the fiscal year ending October 1, 1878, the sum of 381,145 tons, including the coal transported for the use of the road. This was an increase of about fifty per cent. of the amount shipped in the previous year.

ADVANTAGES FOR MANUFACTURING, AND WATER POWER.

The State has all the advantages for manufacturing that could be required by the most exacting. The materials exist in the State, and have not to be collected from other and distant localities by expensive transportation, except cotton, which is just on the border. Where there is deficiency of coal in Piedmont and the Valley, and mountain regions, which may exist in some localities, but that in most instances, because the mines have not been worked, then just on our western borders we have the immense deposits of the Kanawha valley. We have iron unlimited,

abundance of cheap fuel, besides coal, and copper, and zinc, and lead, and gold, manganese, limestone, and clays, and other minerals. The climate, and cheap food, cheap labor, and cheap access to market, all important factors in manufacturing, are claimable by us, and no State can, we think, lay equal claim to this. We have no great extremes of heat or cold; the latter a great objection in Pennsylvania and other States north of us; and we have cheaper labor and cheaper food, and more abundant supply of wood, to say nothing of our supply of the minerals, which enter into manufacturing, than those States. Then our *water power*, the cheapest motive power in manufacturing, is of great extent and value. Almost all the streams in the State have ample fall for many mill-seats. Nowhere can be found a more favored locality for manufacturing, particularly iron, than the line of James river from Buchanan to Richmond; besides Jackson's river, a branch of the James, has a large fall from its head to its union with the James. Lynchburg has an excellent water power, and from this point to Richmond are numerous good manufacturing sites. Lynchburg has already rolling mills, founderies, flour mills, bark mills and other manufactories. Living is cheap here, and coal, iron and lumber are very accessible, with means of transportation to market by water and the railways which centre here. There are many rivers originating in Middle Virginia which have sufficient fall for manufacturing; those in Piedmont have still greater fall, and those in the Valley, and Blue Ridge, and Appalachia, have a fall varying from 500 to 1,500 feet, which may be used for manufacturing. The whole country, from the Potomac to the Dan, abounds in manufacturing sites. Fredericksburg on the north, and Danville on the south, with Petersburg and Richmond and Manchester—at the head of tide, all have abundant water power, and already have important manufactories. Of the 100,000 available horse-power calculated to exist on the James, and to be mostly running to waste, "44,800 of this power is calculated to exist from Richmond to Boshers dam—ten miles—with a fall of 130 feet, and of this power, that less than 2,000 of it is now used for the extensive manufacturing establishments of Richmond and Manchester" (Hotchkiss). The cost of production of iron is less in Virginia than almost anywhere else. Hotchkiss (p. 113) says a Pennsylvania company, for a site in Amherst county on the James river, estimated the cost of making a ton of pig iron in 1875 at \$16.50 per ton. An estimate made for manufacturing a ton at Staunton, Virginia, in 1875, was \$17.25, while Mr. Harriss-Gastrel, of the British embassy, at Washington, who made a voluminous and able report to his government on the iron and steel industries of the United States, says the cost of making a ton of pig iron at Pittsburg, Pennsylvania, as given on p. 273, is \$30.73. The same author says, in speaking of the manufactures of the South, "the fact seems to be

that pig iron can be made from \$15 to \$18, and on an average of \$16 per ton." The same writer gives the cost of a ton of nails in Virginia at \$58.75; in Pennsylvania, \$76.55, and in Missouri, \$79.08. He moreover states the cost of labor per ton of ore is, in the United States, about \$2. In Michigan, it is \$1.83; in New York, \$2.05; in Pennsylvania, \$1.87; in New Jersey, nearly \$3, and in Virginia, 77 cents.

COMMERCE OF VIRGINIA—RICHMOND AND NORFOLK.

Something more may be said of the trade of Richmond and something of that of Norfolk, as indications of the commercial prospects of Virginia, to which only a short space can be allotted. The shipping of *Richmond* has made rapid advance in the last few years, in despite of the financial depression. *The exports for 1875 were \$2,254,609, and for 1876, \$5,046,666.—Richmond Dispatch, January 1, 1877.*

There was some falling off in exports for the year 1877.

Ships drawing sixteen feet of water now come to Richmond, and it is expected the channel will soon be deepened to eighteen feet.

The export trade of *Norfolk* in 1865 was only \$11,538. It has gone on to increase until, in 1876, it was \$7,825,112. In 1865 Norfolk exported no cotton; in 1866 there were exported 733 bales, and in 1876, 106,421 bales were exported. The exports of cotton for 1876 and 1877 prove that Norfolk ranks as the *second* cotton port in the country. The coastwise trade for Norfolk and Portsmouth (the trade of these cities is usually considered as one) aggregated, in 1876, entered and cleared, 2,178,781 tons, and "in the bitter month of December, when all ports to the north were obstructed with ice, we had 160,959 tonnage in coastwise trade." These interesting facts are collected from the *Norfolk Landmark*.

Chesapeake bay and its tributaries are destined to be the great commercial centres on the Atlantic coast, if not in the whole United States, not excepting the Pacific coast. This bay has been called the *continental harbor* of the United States, being the only great, land-locked arm of the Atlantic, and is almost never frozen up in winter, as the northern harbors are (Hotchkiss). It is nearer to the great basin of the Ohio, and the Mississippi, and the Missouri rivers, and to Cincinnati, and Louisville, and St. Louis, and Nashville, and Chicago, than any other point on the Atlantic. Richmond, in the matter of distance, has the advantage of almost a day's expensive freighting over Baltimore, Philadelphia and New York.*

* The Chesapeake and Ohio railroad company is now making preparations to complete its western connections, and we shall soon see an immense trade poured into Richmond by this road.

TRANSPORTATION.

In the description of the counties will be found some enumeration of the various railroad lines which traverse the State, and of navigable water courses and canals. Suffice it to say here, the State is penetrated in every direction by a net-work of railways fully capable of moving her productions to any and all the markets of the world. Tidewater Virginia has 1,500 miles of tidal shore (Hotchkiss), and water transportation to an unlimited extent. Chesapeake bay, extending 200 miles from Hampton Roads, nearly north, penetrates seventy miles of Virginia territory, with a breadth of fourteen to thirty miles, with many affluents traversing this section of the State.

In my First Annual Report will be found a detailed account of various railroads, with the work they are accomplishing, and of the navigable rivers of the State, (page 49).

IMMIGRATION TO VIRGINIA.

Before the financial troubles, immigration was setting very decidedly to the shores of Virginia.

Major Hotchkiss states that before the abandonment of the steamer line from Norfolk to France, as ascertained by United States official returns, the immigration to Virginia through the port of Norfolk "in the year 1873 was 1-39 of the whole of the intending settlers that came to the United States" (p. 145). Virginia offers great inducements to the people of the old world seeking new homes, and to our own people of the United States seeking a milder climate, to settle in our midst. The State is very healthy, our productions varied and valuable, our climate genial, with mild winters, our soil kind and productive, and where not fertile easily improved, our educational advantages equal to those of any State in the Union, our labor cheap and effective if properly managed, our transportation by railroad and water excellent—railroads, or rivers and canals, pervading every part of the State; our coal and iron inexhaustible, with other mineral deposits of great variety and of great value; our water-power very extensive and efficient, existing in many sections, and the advantages for manufacturing almost incalculable; with society refined and the people ready and anxious to receive among themselves honest settlers and farmers from all parts of the world. Added to this, though we are suffering from the financial troubles pervading the world, and the great loss of capital and means with which to carry on the cultivation of our lands, our taxes are moderate in times of prosperity, though bearing very heavily on the people now in

their poverty and low prices of farm products. Many of the States have as high, and some of them higher, rates than Virginia, and larger debts.

Our debt is not larger than that of various other States, and our resources are ample to meet it with the return of prosperity. Our resources are, at the least, \$320,000,000. The census of 1870 puts down our property as assessed at more than four hundred millions. Our debt is about one-tenth of the former amount.

In connection with this subject, I think I may very properly introduce the following interesting letter, as it is so flattering to our State, and must serve to correct prejudices which some, who are seeking new homes, may have formed in regard to Virginia. There are such persons who believe they will not be hospitably treated by the people, and I have had made even this enquiry—whether settlers from the north could live safely in Virginia :

HALIFAX C. H., VA., *January 22d*, 1879.

DR. THOMAS POLLARD,

Commissioner of Agriculture,

Richmond, Va. :

DEAR SIR :

Please accept my thanks for your kindness in sending me your valuable "Treatise on the Hog," also your Second Annual Report, both of which I have read with pleasure and profit, and feel assured their dissemination will be productive of beneficial results. Not having the honor of your personal acquaintance, yet realizing your love and zeal for the prosperity and growth of the agricultural interests of Virginia, I deem it my duty, as well as pleasure, to give you a brief account of my antecedents, and the inducements I had in moving my family and adopting your State as my future home.

I have now been a resident of your State fourteen months, arriving here in November, 1877, and purchasing an estate of 365 acres. The preceding twenty-five years I had been a resident of New York city, and engaged in mercantile pursuits. As you are aware, families desirous of changing a city for a country life, the proper and fashionable thing to do is to go west, and I did go west, as far as Nebraska. I was particularly pleased with portions of Iowa and eastern Nebraska; first-class farming lands, limitless in extent, to be found in both, but the entire absence of forests, no fuel, nor building material on the ground, sluggish and shallow streams, no brooks made up from springs, the sparsity of settlers, lack of schools and churches, high price of labor, and the difficulty of procuring female labor, and their aversion to be considered in the light of servants, but in order to retain their services, must have the rights and privileges of one

of the family, rendered it so objectionable that I concluded to look elsewhere. After my western trip I was induced by friends to travel through Virginia, and after looking about pretty thoroughly, made up my mind to purchase and settle here, and thus far we do not regret the move, and feel assured, all things considered, we could not have done better.

First. We have a large dwelling-house, all the necessary out-buildings, orchard, fruit and flower garden, good arable and timbered lands well watered, and numerous springs, good fences around the entire tract, at a less price per acre, including the improvements, than the bare prairie can be purchased in the favored sections of Iowa and Nebraska.

Second. We find ourselves within walking distance ($\frac{3}{4}$ mile) of churches and schools, both public and private.

Third. We find good help, both male and female, at less than half the price demanded at the West and North, and perfectly willing to be treated and considered as hired servants, and, as far as I have discovered, equally capable.

Fourth. We have cultivated and refined society in our neighborhood, who have shown us every kindness and attention, and are anxious to enlist northern capital and energy to dwell among them.

Fifth. The taxes on real and personal property are very light, being not one-eighth of the amount levied in and about New York city, and not over one-half of the amount levied on farms in Nebraska.

Sixth. The climate is mild and healthful, not subject to the extremes of heat and cold as in the Northwest, and having longer seasons for agricultural labor.

Seventh. To sum up: Families desirous of securing homes in the country can purchase here at less price than at the West, and instead of having the *bare prairie*, with no improvements, get improved farms with the many-necessaries and comforts of life.

Please excuse this lengthy letter, and allow me to remain,

Yours truly,

JOHN H. STEVENS.

Immigration is a great desideratum for Virginia. Immigrants who would come here to buy up our vacant farming lands would add rapidly to our taxable property by the capital they brought with them, by the improvement they might make in the lands they purchased, and the improvement which our present farmers would be enabled to make in their farms with the means acquired by selling off their surplus land. One-half of the land in the State could be profitably sold to immigrants. Most of the States have their Bureaus of Immigration, and these bureaus are being annually formed in the States which heretofore have not had them. There

can be no question but what Virginia should have such a department, as soon as the funds can be spared for the purpose, and indeed an appropriation for immigration would be one of the best modes of enabling us to pay off our debt. Kansas is rapidly acquiring wealth by the number of new settlers she is annually securing by her efforts in this direction. One hundred thousand emigrants are said to have settled in this State last year. Minnesota spent \$50,000 for two years for immigration purposes, and the immediate result was an increase of \$100,000,000 in her taxable property. (Report of Bureau of Immigration of Tennessee.)

Our last Legislature chartered a Bureau of Immigration, without an appropriation. This was done at the instance of the railroads of the State, and is expected to be supported by the railroad companies. This will be a great advantage to the State if funds enough can be raised to make the bureau effective. But the State should aid in the work, for the railroads are not in condition to spare much funds; or the State should charter and support another bureau, which could co-operate with the one just formed. This bureau has been organized, and the general agent, Captain Richard Irby, has gone to work very judiciously and energetically, and all that is now needed to produce excellent results are the means to make publications setting forth the many advantages of Virginia as a home for immigrants, and to scatter these publications throughout the United States and Europe, and also the means to send agents to such points as would be desirable. The "Commissioner of Agriculture" is chairman of the board of managers of the Bureau of Immigration of Virginia.

LABOR IN VIRGINIA.

The "labor system" of Virginia, as well as that of the whole South, has been unsettled by the war and its results; and along with this unsettled condition of labor has come the loss of capital, the lever with which to utilize it properly, not to control it improperly, but to pay it fairly and make it efficient. On our farms there should be no conflict between labor and capital, and there is none. The great difficulty the farmer has is to obtain money enough to pay his laborer promptly and sufficiently for the support of himself and family. If this can be done, we can generally obtain efficient labor in Virginia.

We have the negro as a portion of our permanent population, as far as we can see at present, and he has to be supported from the soil; and it is our policy, as far as possible, to make him a profitable producer, and not permit him to become a drone and a consumer. It has become too much the custom to denounce him as thriftless and lazy. Among this population there are some who will not work, and this is the case in most races

but if the negro is promptly and fairly paid, enough good laborers can be obtained from among them to till our farms properly. Our policy is to elevate and encourage this race in every proper manner, not to debase and abuse it. We are forced to employ the negro, for the present at least, and have no choice. Suppose it were practicable to employ white laborers—that we had money enough to pay them double what we have to pay the negro—to afford them lodgings doubly as expensive as what the negro is content with—to give them flour in place of corn bread—and that we could get from them double the labor we can get from the negro (which is a mere hypothesis)—then what will become of the negro? He must be supported in some way from the joint territory we occupy, if not as laborers, then as pilferers and occupants of our almshouses and prisons. We are told we want intelligent labor, and this is very well if we can pay for it. But farmers of the South cannot afford to employ labor that they cannot superintend and watch and direct. The farmer must do the thinking and planning and directing; and while the laborer should have intelligence enough to carry out details properly, it is a disadvantage for him to have the opinion that he knows more than his employer, and must become director and planner. The farmer must be by himself, or his manager, at all times, with his laborers, to direct their movements. Does not the merchant find this necessary in his business; and must not the engineer, the manager of an engine, stand beside his motive power, to direct and control it, that it may propel and carry to its destination the treasures committed to his care?

Reference is made to a circular issued from my department in June, 1878 ("Stock, Crop and Labor Report"), which exhibits very fairly the condition of labor in the State, as obtained from correspondents among the farmers, and the fact that the negroes are generally working well.

MINERAL SPRINGS OF VIRGINIA.

These are very numerous and of acknowledged efficacy in the cure of disease. Probably no region of the world contains such a valuable collection of mineral springs as does Virginia, representing almost every known character of medicinal water, and of all temperatures found elsewhere. They are surrounded by delightful summer temperature and fine mountain scenery. Most of them are of easy access by the Chesapeake and Ohio, and the Atlantic, Mississippi and Ohio, the Virginia Midland and the Valley, and other railroads. In my "First Annual Report" will be found a detailed account of these springs; and Purcell, Ladd & Co., of Richmond, will furnish to those wishing it, pamphlets containing a description of them, analysis of waters, and diseases to which they are applicable.

MINERALS OF VIRGINIA.

I shall not have much to say further on this subject, as frequent reference has already been made to it in different places, and in description of the counties which follow will be found mention of the minerals situated in each county. I will say again that the mineral wealth of Virginia is very great in minerals of almost every kind; that this wealth is very imperfectly developed, and much remains to discover regarding the minerals of the State. In my "First Report" will be found tables of the different minerals and of their location as to counties, furnished by Professor Mallett, of the University of Virginia.

MINES.

It is difficult to get the statistics of the different mines operated in the State. Owing to the financial pressure, a considerable number have been suspended, which, no doubt, will resume operations as soon as the times are better. In my "First Report" will be found "a statement of the iron ore mines and miscellaneous mines operated on the line of the Chesapeake and Ohio railroad," furnished under direction of General Wickham, receiver, October 1, 1877, by General St. John, consulting engineer, describing thirty-three mines and furnaces, either in operation or only temporarily suspended.

The following is a "statement of iron furnaces near the line of Atlantic. Mississippi and Ohio railroad, and of the mineral enterprises, capacity and status January 1, 1878," furnished under direction of the receivers of the road, Messrs. Perkins and Fink, which was received too late for my first report:



STATE-

Of Iron Furnaces near line of A. M. & O. R. R. Co., in Virginia,

NAME.	Distance from Shipping Point.	Capacity per annum.	Present status.
Panic furnace	6 miles, Rural Retreat.....	1,800	Out of blast...
Reid Island furnace.....	12 miles, Martin's	800	Out of blast...
Allasonia furnace	12 miles, Martin's	400	Out of blast...
Radford furnace.....	9 miles, Watson's.....	3,600	Out of blast...
Speedwell furnace.....	7 miles, Crockett's.....	1,400	In blast
Ravencliff furnace.....	9 miles, Crockett's.....	3,000	In blast
Eagle furnace.....	9 miles, Crockett's.....	1,200	Out of blast...
Wythe furnace.....	7 miles, Crockett's.....	3,000	Out of blast...
Grey Eagle furnace.....	15 miles, Max Meadow.....	800	Out of blast...
Walton furnace.....	6 miles, Max Meadow.....	800	Out of blast...
Brown Hill furnace.....	10 miles, Max Meadow.....	800	Out of blast...
Graham's forge.....	12 miles, Max Meadow.....	{ Pig 400 Bloom 200 }	{ Out of blast...
Huddle's forge.....	11 miles, Max Meadow.....	400	In blast
John's Mountain furnace.....	17 miles, Christiansburg.....	3,000	Out of blast...
By the Lead and Zinc Mine company..	11 miles, Max Meadow.....	{ Lead 600 Zinc 2,000 }	{ In operation
Mercer Zinc Works	10 miles, Max Meadow.....	1,000	In operation..
Birmingham Iron and Coal company..	6 miles, Lynchburg.....	{ Large deposits of red on line of south-side di	

Near Christiansburg and Martin's deposits of coal are being

MENT

and of other Mineral Enterprises, capacity and status, January, 1878.

Proprietor or company.	Post-Office Address.	Counties in which the Works are Situated.
Terry & D. Pierce.....	Wytheville, Virginia.....	Smyth county, Virginia.
Graham & Robinson.....	Graham's Forge, Virginia.....	Wythe county, Virginia.
D. S. Forney.....	Graham's Forge, Virginia.....	Wythe county, Virginia.
Isett & Culbertson	Radford Furnace, Virginia.....	Pulaski county, Virginia.
D. E. James & Son.....	Speedwell, Virginia.....	Wythe county, Virginia.
Crockett, Sanders & Co.....	Crockett's Depot, Virginia.....	Wythe county, Virginia.
Crockett, Sanders & Co	Crockett's Depot, Virginia.....	Wythe county, Virginia.
Sayres, Oglesby & Co.....	Wytheville, Virginia.....	Wythe county, Virginia.
B. Gallup	Wytheville, Virginia.....	Wythe county, Virginia.
Howard & Sanders.....	Max Meadow, Virginia.....	Wythe county, Virginia.
J. P. M. Zimmerman.....	Brown Hill, Virginia.....	Wythe county, Virginia.
Graham & Robinson	Graham's Forge, Virginia.....	Wythe county, Virginia.
David Huddle.....	Brown Hill, Virginia.....	Wythe county, Virginia.
J. S. Williams.....	New Port, Virginia.....	Giles county, Virginia.
J. C. Raper, agent.....	Max Meadow, Virginia.....	Wythe county, Virginia.
.....	{ Mercer Zinc Works, Tren-	} Wythe county, Virginia.
.....	{ ton, N. J.	
hematite and magnetic iron ore	{ Mt. Athos, Virginia.....	Campbell county, Virginia.
vision now being worked		

worked to a limited extent and shipped to local stations.

General St. John, in reply to my inquiry as to the amount of cold transported over the Chesapeake and Ohio railroad for the last twelve months, writes me that for the "fiscal year" ending October 1, 1878, it amounted to 381,145 tons, which, I understand, is a large increase (I think about 50 per cent.) over the previous year.

The coal mines in the Richmond coal fields, on both sides of the river, are largely worked.

Mr. J. T. Jones, of Henrico county, has furnished me with an account of the "Richmond coal field," and has kindly loaned me a volume on the "Coal, Iron, and Oil" of the United States, by Messrs. Daddow & Bannon, published in 1866, which contains a good description of this Richmond coal field. From these sources the following information is obtained: The "Richmond coal field," on both sides of the river, lies within the granite basins of the primitive formations, but is nevertheless the latest creation. This coal field crosses the James river about twelve miles west of Richmond, and extends in a north and south direction to the Appomattox, twenty miles west of Petersburg. It is about thirty miles long by five miles wide, and contains an area of about 150 square miles. But, perhaps, less than half this area contains available coal, owing to the undulations of the granite which rises to the surface repeatedly, in many sharp and abrupt peaks. The basin is irregular and is surrounded by a fine-grained granite, resembling sienite, which produces an excellent building material, almost equal to marble in appearance. The field consists of a series of deep basins, the inequalities of which are in a measure modified by the sedimentary deposits which preceded the coal. But these deposits only filled the deeper hollows, leaving the coal to be, in many cases, stratified on a granite base. We find some comparatively steep dips in this coal field, but it is rare to find any available coal on these abrupt dips. All the irregularities are caused, with one or two rare exceptions, by the original inequalities of the granite floor. The basins vary in depth, but the principal ones are about 100 feet deep. The dips of the measures on the east sides are from 20° to 40° , and sometimes much greater, but on the west the dips (dipping east) are from 25° to 80° , or sometimes perpendicular. The basins generally contain large deposits of coal, varying from twenty to sixty feet in thickness, particularly on the south side, where all the available coal is found in one bed, near the base of the measures, and not much above the granite. The basins containing the coal are from 700 to 1,000 feet deep from the surface. The bed varies from ten to sixty feet in thickness, but the average is from twenty to thirty. In these deep basins the coal is very dry and gaseous, containing a large amount of gas, but a limited quantity of bitumen. It cokes indifferently, being too dry to form a good, solid coke, but is reasonably pure. It makes an acceptable gas—

better than Nova Scotia coals and those from eastern basins of the Alleghany field—but not equal to the gas produced by the richer coals of the interior basins, or the cannels of Kanawha. The authors of the work alluded to, say “that the modes of mining pursued in this field are exceedingly primitive, and the cost of producing at least double that of our anthracite or western coal fields. Experience and capital would undoubtedly remove some of the expense and render mining more profitable, but the formations of this field are so peculiar and uncertain that no man, however experienced in other coal fields, should feel confident in this without much study and investigation. With all the practical information that can be obtained, the chances will be unfavorable. It is true that most of the blunders and failures made in the Richmond coal field are the result of ignorance, but rather a want of local information than of general mining experience. The changes are so frequent and irregular, and but seldom betrayed on the surface, which is a series of undulating sand-hills, that no judgment, however practical, can be depended on without actual testing by proof-shafts. If a deep shaft is sunk on an anticlinal crest (anticlinal line is a line in which strata dips in opposite directions), where the measures are nearly flat, the work is useless; and it is not always possible, even with exploring pits, of being certain of starting in the right locality, since those ‘troubles’ do not always betray their existence in the upper strata. * * * We do not write this to discourage the development of the Richmond coal field, but to put capitalists on their guard. We think there are few coal fields more inviting to the miner than the Richmond basins, but there are none where skill and engineering talents are more needed to secure success. Success, however, is certain to those who go prudently to work and develop with sound judgment. As an evidence of the want of practical knowledge displayed by the miners of this district, the author of this book says that “at the Midlothian mine, where at a late day, when nearly all the coal accessible to the pit had been extracted, an immense and complicated Cornish engine was erected at great expense (we think \$70,000), when one of the common ‘Bull engines,’ or a good high-pressure, costing less than one-third, would have been more available.” The author thinks that “the mining operations in the Richmond coal field have generally been of the most primitive character, and may be referred to the early days of Stephenson in England. * * * Great and permanent injury has been done to a large portion of this coal field by numerous small pits sunk along the out-crops to the depth of 100 to 200 feet. Those mines have been long abandoned, and are filled with water, and it becomes dangerous now to approach them from the deeper pits, which now yield all the available coal.”

The author states that the average amount of coal mined in the Richmond coal-field before the war was about 100,000 tons of coal per annum.

Mr. Jones, in giving an account of the individual coal mines now worked, alludes to the mines in Powhatan county, worked in a small way. They are mentioned in connection with the description of that county. He thinks these mines are not on the true western out-crops of the main coal fields, but rather are located on the angular basins; hence the coal is shallow and full of "faults and troubles."

Mr. Jones says, on the eastern out-crops of the basin, four or five miles north of the James River and Kanawha canal, are situated the Caney Hill mines in Henrico. Mr. F. H. Torrey is engaged in mining here natural coke, which is not known to exist in any other region of the western coal fields. Messrs. Daddow & Bannon speak of the "soft coke" raised here as being excellent and burning beautifully, like good red-ash anthracite. The hard or popping coke is less valuable. It ignites with difficulty, and flies or "spits" in burning. In appearance this "natural coke" is much like the artificial coke formed from a rich caking bituminous coal, and in character is a true carbon.

Mr. Jones then describes the Midlothian and Black Heath mines, about twelve miles from Richmond in Chesterfield. The latter has been worked out and abandoned. (Daddow & Bannon). There are several mines in this neighborhood, but the principal one is the Midlothian, worked by John Burrows, the owner. This mine is worked quite extensively. The coal is raised from a depth of from 800 to 1,000 feet. This mine in former years produced about a million of bushels annually.

O'Bryan & Co. are working a mine, on a tract of land owned by an English company, called "Black Heath." Mr. Jones does not say whether this is the old "Black Heath" mine, though we presume not, as here the mine is not more than 400 to 500 feet deep. The mine adjoins the Midlothian, and is on the side of the Richmond and Danville railroad.

Jewett & Bro. are mining at a place called "the Cunliffs' old pits," on the Richmond and Danville railroad. Neither of these mines are worked extensively. The "Bright Hope," formerly the "Clover Hill mines," principally owned by Mr. F. Stearns, are in Chesterfield. These mines are being operated very considerably, and the coal is highly esteemed. An account received from the agent in Richmond will be found under the head of "Chesterfield Coal."

EDUCATION.

Dr. Ruffner, "Superintendent of Public Schools," at my request furnished me last year's information concerning our public schools and educational advantages, which was published in my "First Report." I give some extracts from this article now:

"In 1850 there were in all the schools in the State, public and private, 52,000 children, and in 1860 there were 67,000, of whom 31,000 were pauper children. The present system was enacted by the constitution framed in 1868, to be supported by taxation, State and local, and by the interest received from the literary fund. The system was to be administered impartially as between the races, and to be in operation by 1876. The first legislature which met after the adoption of the constitution promptly took up the subject, and on the 11th July, 1870, passed a complete school law embodying a thorough and effective system, which was immediately put in operation, and has continued to grow in strength and usefulness."

A great change occurred immediately on the introduction of the State school system. In 1870-71, the total number of children at school rose to 158,000, an increase of nearly 100,000 in one year. Excepting one year, there has been a gain in the public schools every year since their establishment. In 1875 the whole number of pupils (white and colored) enrolled in the public schools was 184,000; in 1876, the number was 200,000; in 1877 the number was 205,000. To these are to be added about 25,000 attending private schools, which would give as the whole number of children now enrolled in all the schools of the State 230,000. Of the 205,000 in the public schools in 1876-77, 140,000 were white and 65,000 colored.

The public school system is administered by a State board of education, consisting of the governor, the attorney-general, and the superintendent of public instruction.

There were in Virginia, according to the report of 1876-77, nearly 4,700 public schools, taught by about the same number of teachers. These schools were in operation an average of 5.62 months.

The cost of the public school system in 1876-77 for all purposes (including permanent improvements) was \$1,050,346.57. Of this about one-third came from State funds, and two-thirds from county and district funds. The sum of \$778,883.44 was paid out of this to teachers.

The schools are free to all children between five and twenty-one years of age, except that a monthly charge of \$2.50 may be made for the higher branches, which are taught in some of the schools. Equal educational privileges are secured by law to white and colored, with the provision that they shall be taught in separate schools. The minimum school term is five months, and the minimum number of pupils to constitute a school is fifteen. Average monthly salary of male teachers is \$33.10, and of females, \$27.37.

HIGHER INSTRUCTION.

There are public high free schools in a few of our cities and towns, separated from the lower, but commonly the higher branches are taught in the primary schools (where taught at all), and form a mere continuation of the lower branches.

There are about sixty private male schools, and about seventy private female schools, of high grade, in the State.

COLLEGES.

Virginia is well provided with colleges. There are three State institutions, as follows :

NAME.	LOCATION.	RELIGIOUS DENOMINATION.
University of Virginia.....	Charlottesville.....	Non-sectarian.
Virginia Military Institute.....	Lexington.....	Non-sectarian.
Virginia Agricultural and Mechanical } College.....	Blacksburg.....	Non-sectarian.

The University of Virginia is remarkable among the colleges of the United States for the thoroughness of its instruction and its high standards of graduation.

Besides these colleges, which are controlled by and receive aid from the State, the following (excepting Hampton Institute) are unconnected with the State :

NAME.	LOCATION.	RELIGIOUS DENOMINATION.
Washington and Lee University.....	Lexington.....	Non-sectarian.
Emory and Henry College.....	Emory.....	Methodist Episcopal, Sth
Hampden-Sidney College.....	Hampden-Sidney.....	Presbyterian.
Randolph-Macon College.....	Ashland.....	Methodist Episcopal, Sth
Richmond College.....	Richmond.....	Baptist.
Roanoke College.....	Salem.....	Lutheran.
William and Mary College.....	Williamsburg.....	Non-sectarian.
Hampton Normal and Agricultural In- } stitute (for colored students).....	Hampton.....	Non-sectarian.

These colleges are nearly all of them flourishing, and afford to the young in every part of the State every opportunity for a thorough collegiate education. The religious influence exerted at all of them is one of their most noteworthy features, and compares very favorably with that of any of the United States.

In this connection, (Virginia colleges), we think the following is worthy publication :

Senator John W. Johnston states that Virginia "is not only not inferior to her sister States of the north in respect to educational advantages, but superior to most of them," and he supports this assertion by statistics. General Eaton, the United States Commissioner, issued a circular in 1872, giving the whole number at the colleges in five States, and also the number of students from each State in which the college is located, as follows :

	Total No. of Students.	From the State.
Connecticut.....	887	244
Massachusetts.....	1,186	516
New York.....	2,243	1,668
.....	1,639	1,301
Pennsylvania.....	1,622	1,145

Senator Johnston then compares this showing with the reports of the several colleges and universities in Virginia for 1873. They are as follows :

	Whole No. of Students.	No. from State.
University of Virginia.....	342	157
Washington and Lee University.....	263	81
Virginia Military Institute.....	275	116
Wythe and Henry College.....	180	59
Woods-Sidney College.....	92	65
Polk-Macon College.....	234	167
Monroe College.....	191	176
Roanoke College.....	160	108
Richmond and Mary College.....	68	63
Virginia Agricultural and Mechanical College.....	132	132
Botetourt Normal and Agricultural Institute.....	133	83
Total.....	2,070	1,207

This general summary of Virginia is not over-wrought, and I regret I cannot extend it. It would seem sufficient, however, to make our own people satisfied with the favored State they inhabit, and to attract to her border those seeking new homes, particularly the people of Europe living in the same latitude with us, and also the dwellers in the colder regions of the United States, who seek a more genial climate with winters mild enough to prosecute the cultivation of the soil through most of the season, and who desire to raise stock at a comparative small cost for feeding in the winter months. One point not sufficiently dwelt on is the fact that Virginia is one of the best watered countries in the world. Compare this with the prairie lands of the West and the lands of many other States.

We have the advantages, not enumerated for want of space, in the words of Commodore Maury, "The more I search the old State the more she reminds me of the magic sheaf of wheat, which the more it was threshed, the more it yielded, for the more I study her valleys and mountains, her waters, climates and soils, the more I am impressed and astonished at the variety, abundance and value of her undeveloped treasures; and the vastness of the wealth which lies dormant in her borders waiting only for capital and labor to develop and utilize, dazzles the imagination." No one was more competent to speak intelligently and truthfully of the resources of Virginia than *Commodore Maury*.

VIRGINIA AND ENGLAND.

In comparing agricultural countries, the mind instinctively turns to England as the standard. For more than 800 years since the Norman conquest, and for more than 1,200 years since the Saxon rule, England has been improving and maturing her agriculture, while Virginia was an unbroken forest until about 270 years ago. The mind can scarcely grasp what Virginia may, and should be, when she reaches the age of England, or even in one century, from the present. England had not the natural advantages of Virginia. In size England is rather the largest, containing about 50,000 square miles, and Virginia about 45,000. England was originally full of marshes, which have been drained, and the lands reclaimed to agriculture. We have all heard of the great "Lincolnshire fens," the home of thousands of wild birds and fish, long since drained and embanked by the government, and now covered with luxuriant crops. Only a little more than one hundred years ago England turned her attention to her roads, now the finest in the world, and of inestimable value to the farmer, and an example for Virginia some day to follow; and what a blessing it will be when our roads are half as good only as those of England. Looking on the map of England we see the absence of the mag-

nificent rivers which intersect the surface of Virginia; and where England has water transportation through her territory, it is by canals. Nature has given to Virginia a much wider circle of soil production. England raises no Indian corn, tobacco, cotton, very few fruits, except under glass, which the masses never taste, no sweet potatoes, no peanuts, no tomatoes, and indeed very few vegetables except in hot houses. In the number and variety of our fish we much surpass England, and the oysters of the latter are so salt and small as to be scarcely edible. In mineral wealth Virginia has largely the advantage. England has great deposits of coal, has lead, gypsum, zinc, copper, limestone and salt, but is deficient in fine marbles and building stones, and particularly in iron. She works up large quantities of poor argillaceous iron ore, and has to import largely from Norway and Sweden the better class of iron for steel making and other purposes. England has no mineral springs that compare in value or number with those of Virginia. As to climate Virginia has great advantages. The former has great quantities of limestone, and limestone soil, and is a great grass country. Virginia has to counterbalance this, her marls through Tidewater and her limestone through much of the country west of Middle Virginia, and this latter is so located as to put it in her power to use lime on her lands from the country west of her, and the Northern lime.

As an evidence of the impression made on an Englishman by Virginia in her virgin state, we quote from the pen of Captain John Smith, who said "*Heaven and earth never agreed better to frame a place for man's habitation.*"

VIRGINIA BY COUNTIES.

CONTAINING A BRIEF COMPILATION OF FACTS REGARDING THEIR SOILS, PRODUCTIONS, IMPROVEMENTS, AND GENERAL RESOURCES.

These facts and statistics have been obtained by circulars (about 750 in number in 1877, and half as many in 1878, with a very moderate number of replies) sent out to farmers and others in the State, by reference to the "Report of the Auditor of Public Accounts for 1876 and 1877," and to the census of 1870. The census, to which reference has been principally made to ascertain the population, we find in some respects very inaccurate, though in this particular is probably nearly correct, agreeing tolerably well with a computation made of the population of the voters to the whole population, and the proportion of the listed subjects of the capitation tax (males above 21) to the whole population. No flattering exhibit of the resources of the counties has been attempted, and only a short description of their advantages has been given for want of space. The description of some of the counties is much larger than that of others, dependent on the information derived from correspondents. The analyses of minerals and marls found in the description of the counties are from Professor Rogers' report. Decimals are generally left out.

ACCOMAC COUNTY

Is one of the two counties forming the Eastern Shore of Virginia. It contains 243,651 acres of land and 20,409 inhabitants. The surface is level; soil, a light, sandy loam, productive and easily tilled. Its products are corn, wheat, oats, sweet and Irish potatoes, and other vegetables and fruits. This is a good fruit country, especially for the peach and small fruits. Its extended water lines, on bay and sea coast, afford easy and cheap transportation to market, and furnish fish and oysters and wild fowl in great abundance.

The land is assessed at \$21.50 per acre. Our correspondents report prices ranging from \$5 to \$50 per acre.

Number of farm animals—horses, mules, &c., 3,532; cattle, 8,620; sheep, 3,849, and swine, 13,432.

The farm products of this county are ample for the sustenance of its inhabitants (except wheat), and furnish large exportations of potatoes and other vegetables. Commercial fertilizers are in general use; some lime is used; but little gypsum. There are no minerals. The special attractions of this country are its kind, easily tilled and productive lands; its oysters, fish, game, and the ease with which the necessities and luxuries of life can be obtained; the kindness and hospitality of the people; its pleasant and salubrious climate, with the breezes wafted over salt water from almost every point of the compass; and its light, sandy soil, which is very cheaply tilled, and makes bountiful returns for the labor bestowed on it. One mule or horse to a plow is all that is needed; work animals need no shoeing, and the implements of the farm last a long time. Fruit is a very certain crop, being rarely injured by frost, as the climate is tempered by the winds blowing across the Gulf stream, a current of warm water flowing from the Gulf of Mexico. There cannot be found anywhere, a locality combining more advantages and inducements to immigrants than the two counties forming the peninsula of the Eastern Shore.

ALBEMARLE COUNTY

Was formed in 1744 from Goochland county. It is thirty-five miles long, with a mean breadth of twenty miles. It is mountainous and rolling. The soil is a dark, rich red clay. The productions are corn, wheat, oats, tobacco, and grass. The timber consist of oak, chestnut, locust, pine, hickory, poplar, sycamore, maple, beach, walnut, gum, and dogwood. The population is 25,677. Number of acres of land, 500,787; assessed at \$6,220,115. Number of horses and mules, 3,795; cattle, 6,029; sheep, 6,810; swine, 8,927. It is watered by the James, Rivanna, Hardware, Rockfish, Moorman's, Meechum's, Doyle, and Lynch rivers, and by Ivy, Buck Mountain, Moore's, Mechunk, Buck Island, Beaver, Priddy's, Totier, Ballenger, and Green creeks. The minerals are iron, lead, gold, soapstone, and limestone. Factories: 1 woolen, 2 carriage, 1 sash and blind, 1 broom, 1 iron-casting, 1 cigar, 1 agricultural implement, 1 grape-box, 25 flour mills, 1 sumac-mill, 1 brewery, 2 wine-cellars, 1 distillery of grain, and many fruit distilleries, and numerous tan-yards. Wheat acreage, 80,613—average yield, 16 bushels; tobacco, 8,061—yield, 700 pounds; oats, 36,781—yield, 10 bushels; clover and orchard grass, 129,000—yield, 1½ tons; corn, 53,742—yield, 20 bushels. Number of dogs, 6,000; sheep killed by dogs, 500—valued at \$1,500. Number of acres in orchard, 1,612—apples, peach, pear, cherry, plum, and grapes. There are 3 newspapers; 103 schools, of

which 95 are public and 8 private. Seventy-six churches—viz: 34 Baptist, 22 Methodist, 7 Episcopal, 5 Presbyterian, 4 Disciples, 1 Lutheran, and 1 Roman. It has one bank ("The People's"), with a small capital. Number of immigrants in the past five years, 350, of whom nine-tenths are English. The productions of this county are ample for the support of its inhabitants, except in bacon, with a large surplus for market. Gypsum and artificial manures, are largely used by the farmers. It is traversed from east to west by the Chesapeake and Ohio railroad, and from north to south by the Washington City, Virginia Midland and Great Southern railroad. Our celebrated "University" is in this county, at Charlottesville, the county seat, which is a very attractive town, with a population of 4,500. The "Miller Manual Labor" school is in this county, and has been inaugurated under very favorable auspices.

Monticello, the residence and burying place of Thomas Jefferson, is romantically situated on a mountain near Charlottesville. Albemarle is a picturesque portion of the State, is considered very healthy, the lands are of excellent quality, the population is refined and well educated, and few sections offer better inducements to immigrants.

Limestone, near Dyer's mills, shows a percentage of 77 carbonate lime. Another specimen from Hancock's quarry has 60 per cent, carbonate lime. Another from Buck Island creek has 76 per cent. carbonate lime. Limestone very similar to the Potomac marble runs through this and other counties of this region, and some of it, when polished, presents a surface of equal variety and beauty. Many of the rocks of this region are feldspathic, and by their disintegration furnish valuable supplies of potash to the soils. A bed of this feldspar, near the University, has been found by Professor Emmet to furnish a material susceptible of various useful applications. When baked at a very high temperature this rock may be made into hones of a very fine and sharp texture. It admits of being readily carved, or turned into crucibles and other useful implements for which it is well fitted, by its power of withstanding heat, and forms a very valuable fire-brick. Slate is also found.

Grapes are successfully raised in this county, and are beginning to be a large interest. Wine of good quality is made by the Monticello Wine Company, and grapes are exported to Richmond and northern markets. Roads are improving under the wise management of the county judge.

ALEXANDRIA COUNTY

Is ten miles long by four broad, and was originally a part of Fairfax county. It was ceded to the Federal government and became a part of the District of Columbia. It was retroceded in 1847, and now belongs to Virginia. It is

ended on the north and east by the Potomac river, and on the south and west by Fairfax county. The Alexandria canal passes through it. Two pikes and several county roads lead into the District of Columbia, and two free and one toll bridge. The railways leading from the south to the national capital traverse it. The Washington City, Virginia Midland and Great Southern railroad starts from the banks of the Potomac, in the northern portion of the county, and within the corporate limits of the city of Alexandria, and passes out in a southwestern direction through the State to connect with the Richmond and Danville railroad at Danville. The city of Alexandria lies on the west bank of the Potomac, is six miles from Washington and one hundred and ten from Richmond. The population in 1870 was 13,570. The water and rail communication at this point is not surpassed by any city in the Union at the same distance from the ocean. Besides the facilities of water, by first-class steamers, via the Potomac and Chesapeake bay, with a depth of forty-five feet at her wharves, she has the Chesapeake and Ohio canal to Cumberland, Maryland; the Washington and Alexandria, the Washington and Annapolis, the Alexandria and Fredericksburg, and the Washington City, Virginia Midland and Great Southern railways, all have terminal points here. The soil of the county is highly enriched, and used for the production of the usual farm products, and of vegetables, milk, butter, fruits, &c., for the consumption of the large cities and the towns near by. It has a population of 16,955. Number of acres of land, 18,183, assessed at \$1,002,516. There are 553 horses and mules, 490 cattle, 90 sheep, and 826 swine.

ALLEGHANY COUNTY

It was formed in 1822 from Bath, Botetourt and Monroe. It is twenty-six miles in length, with a mean breadth of twenty miles. This county consists of lofty mountains and valleys of great productiveness. It is drained by the head-waters of the James. It contains 463,900 acres of land, assessed at \$1,064,850.

The farm animals are horses, and mules, 1,031; cattle, 2,625; sheep, 1,015; swine, 3,076. The population in 1870 was 3,674.

This county has some fine valley lands, and produces large crops of corn, wheat, buckwheat, oats, rye, tobacco, and hay, and fruits, particularly apples. Grass and grazing land in the valleys and mountain sides, afford pasturage of the finest kind, and stock raising could be made very profitable. Bee culture is very successful here. Its principal streams are Jacks river and Cowpasture, which unite and form the James, about fifteen miles below Covington, the county seat. The Chesapeake and Ohio railroad traverses this county. Commercial fertilizers are little used in this

county. Lime and plaster are used; the latter acts finely on meadow and clover. The farm products afford a large surplus for sale. Iron ore is abundant, and are extensively mined. Clifton Forge mines are in this county. The *brown hematite* worked here, by analysis, contains forty-five to fifty-eight per cent. of metallic iron, phosphorus 0.54 to 0.96, silica 2 to 12, manganese 3, sulphur 3, alumina 1.46, water 11. The ore worked contains 55 iron, silica 6.29, phosphorus 0.60. (Decimals generally omitted). The county contains also magnetic iron.

The Callie mines, the Lowmoor mines, and Haynes' mines are in this county. The first and last work brown hematite, with an average of 55 per cent. in furnace. The Lowmoor work fossil and brown hematite, and are rich in iron.

Analysis (Professor Rogers) of iron ore, Bushy Hill, Jordan's mine, showed 23.94 grains of peroxide iron (with no deleterious substance) in thirty grains, purplish brown, texture compact, structure cavernous.

We have recently seen it stated that another large forge was being built at or near Clifton Forge.

AMELIA COUNTY.

Was formed in 1734 from Prince George. Its length is about 30 miles, and mean breadth ten miles. This county has a rolling surface and abounds in fine farms. The principal productions are tobacco, corn, and oats. Tobacco is the main money crop, and is of very superior quality. Fruits and the vine do well when attended to. Clover and grass succeed well on enriched land. The timber consists of oak, hickory, walnut, gum, beach, birch, poplar, dogwood, &c. This county contains 223,304 acres of land, assessed at \$1,178,027. The population in 1870 was 9,878. The number of horses and mules, 1,452; cattle, 3,212; sheep, 1,983; swine, 4,426. The Richmond and Danville railroad traverses this county, giving quick and easy communication with Richmond, from which city the centre of the county is about thirty-six miles distant. It is drained by the Appomattox river, which bounds its eastern and northern parts, and affords some fine bottom lands, and some navigation.

This county contains plumbago, steatite, mica, &c. The health of the county is excellent. There has been considerable emigration to the coast since the war.

AMHERST COUNTY

Was formed from Albemarle in 1761. It lies on the north side of the Shenandoah river, and is bounded on the southwest and southeast by that river, on the northwest by the Blue Ridge mountains. It is twenty-two miles long and nineteen wide. The soil is dark-red clay, very rich and pro-

Corn, wheat, oats and tobacco are its principal crops; the grasses well here, and bee culture is followed to some extent. This is a fine region, the apple, especially, being largely cultivated. The timber is hickory, walnut, maple, dogwood, poplar and pine. It contains 302,455 acres of land, assessed at \$2,068,231. Population in 1870, 14,900. Farm animals: Horses and mules, 3,063; cattle, 5,324; sheep, 2,220; swine, 9,026.

The lands are cheap in price and yield remarkably well. The farmers buy all their supplies, and ship largely to market. The James River and the Rappahannock canal furnishes cheap transportation to Lynchburg and Richmond, and the Washington City, Virginia Midland and Great Southern Railroad passes through the centre of the county from south to north. The principal minerals are iron ore, both magnetic and specular, from which the finest grades of iron is made and *steel* by the Bessimer process. Copper ore is also found here. The iron ore is abundant, and is probably unequalled in this section by any iron ore south of Lake Superior.

Fertilizers are used to some extent on tobacco. Lime and plaster have both been tried with good results. Very healthy climate.

It is stated somewhere that Amherst took a premium for the best wool at the Centennial fair in Philadelphia, though this may lack confirmation. Blue marble is found in this county similar to the Potomac marble, which, when polished, presents a surface of equal variety and beauty. Plumbago occurs in considerable masses in this county, and beds of rock containing iron carbonate, associated with a little sulphuret of copper.

APPOMATTOX COUNTY.

This county lies on the south side of the James, and was formed in 1845 from Buckingham, Prince Edward, Campbell and Charlotte. It is about thirty-six miles long and nineteen wide. It is watered by the James, which forms its northwestern boundary, and the Appomattox, and their tributaries. The Atlantic, Mississippi and Ohio railroad passes through the southern part of the county. The timber consists chiefly of oak, hickory, chestnut, maple, poplar and dog-wood.

The surface is hilly and broken, with a good proportion of bottom land along the stream. The hill lands are gray slate soil. Productions—tobacco, corn, oats and wheat. The grasses do well here—clover, orchard grass and timothy.

The population in 1870 was 8,950. Number of acres of land, 209,198, assessed at \$884,056. Our correspondents estimate the average value of land at \$7 per acre. Commercial manures are used largely on tobacco;

some farmers report having used lime to advantage. Gypsum is used on grass land, generally with good effect. This county is self-supporting as to all farm products, and sells much wheat and tobacco.

This is a very healthy region, and the cheap lands and facilities for reaching market render it desirable for immigrants.

Iron ores, copper, gold, manganese, steatite, mica, plumbago, asbestos, &c., are found in this county, most of them in abundance and of fine quality. Farm animals: horses and mules, 1,396; cattle, 3,621; sheep, 1,569; swine, 4,970.

AUGUSTA COUNTY

Is one of the counties of the famous "Valley of Virginia." The surface is uneven and mountainous on its east and west boundaries, which are the Blue Ridge and Apalachian chain. The valleys between these mountains are extensive and very fertile, embracing the head waters of the Shenandoah river and that part of the "Valley of Virginia," at its greatest width. It is about 35 miles long and 30 wide, with an undulating surface abounding in hills, fertile and well watered valleys, with fine water-power. It abounds in a variety of soils, producing wheat, corn, oats, rye, barley, buckwheat, potatoes, turnips, beets, &c.; also the various grasses for hay and pasturage. This county is noted [for its fine horses, fine cattle, hogs and sheep, the latter having been greatly increased and improved since the enactment of a "dog law" for their protection. This county is notable for the number and excellence of its flouring mills, propelled by the finest water-power. It has 678,707 acres of land, assessed at \$8,560,140. The population in 1870 was 28,763; now, including city of Staunton, is about 34,000. The number of farm animals, horses, mules, &c., in 1878, 8,643; cattle, 19,635; swine, 22,143; sheep, 11,287. There are many mineral springs of excellent water of their kinds, among them the Stribbling springs, and many minerals found in this county, such as iron ore (brown hematite and specular), manganese in large quantities, marble, kaolin, with a large factory awaiting capital to operate it, and coal of an anthracite character. There are six or more iron furnaces, besides a considerable number of forges, which have been operated in this county on the vast deposits of iron ores. The various fruits thrive in this county. Timber: oaks of the several kinds, white oak being very abundant and of superior quality, hickory, chestnut, walnut, poplar, maple, beech, dog-wood, white-ash, locust, pine, cedar, &c. Tanner's bark may be had in large quantities, and staves, hoop-poles, &c. The healthfulness of this region is noted. The Chesapeake and Ohio railroad passes through it, and is intersected at Staunton by the Valley railroad, connecting it with Baltimore in nine hours, and with Washington in seven

hours, and the macadamized "Valley Pike," an excellent road, giving ready communication to various markets east, west and north. Staunton, a flourishing and beautifully situated town of nearly 7,000 inhabitants, is the county seat; here are the "Western Lunatic Asylum," the "Asylum for the Deaf, Dumb and Blind," four female colleges (under the Presbyterian, Episcopal, Methodist and Lutheran denominations, but not sectarian), the Augusta Female Seminary, the Virginia Female Institute, the Wesleyan Female Institute, and the Staunton Female Seminary. Staunton is destined to be a large town, possessing great advantages. The people of Augusta are intelligent, industrious and homogeneous. Through the county stretches a band of *magnesian* limestone, and it is found near Wier's cave, west of Waynesborough, northwest of Staunton, near the base of Little North mountain, and numerous other places. Its *hydraulic* character has been well tested. This limestone, from which *hydraulic cement* is made by burning, constitutes an important part of the formation of the valley, both from its extent and economical value. It is usually of bluish grey, sometimes blended with yellow or brown, and sometimes dark blue, but the best guide to its recognition is the *dullness* of the surface, even when freshly broken, and the absence of fine grain of most limestones. Those in Augusta contain about from 44 to 53 per cent. of carbonate lime, and 33 to 35 per cent. carbonate magnesia, and 2 to 7 of silica. The other constituents are generally alumina and oxide of iron in moderate proportions. A New York marble firm has recently leased the Craigsville marble quarry in this county, and expect to work it largely. The marble is represented as being very superior, finishing up in beautiful style, being more durable and smoother than the Tennessee marble, and equal to much of the Italian marble which is used on the finest furniture. A quarry of good slate has been opened recently north of Staunton.

BATH COUNTY

Was formed in 1790 from Augusta, Botetourt and Greenbrier. It is about 35 miles long and 25 broad. It is watered by the water sources of the James, the Cow Pasture, and Jackson rivers. Most of the county is mountainous, with many fertile valleys. It has 617,402 acres of land, valued at \$803,715; and a population of 3,795. The farm animals are: Horses and mules, 1,325; cattle, 4,589; sheep, 5,121; hogs, 3,295.

The soil is alluvial on the rivers, decomposed slate and sandstone on the high lands. The productions are corn, wheat, oats, and the grasses; beef-cattle, horses, and pork. Our correspondents give the price of lands at \$5 to \$25 for improved, and \$1 to \$5 for unimproved lands. There are many valuable minerals in Bath, but they have not been developed to any

considerable extent. Iron ores are found in large quantities. The Capeake and Ohio railroad passes through this county. The Hot springs, Warm springs, Alum, and Healing springs, of this county, have a high reputation for the excellence of their mineral waters.

The "Randolph iron mines" are at Milboro', in this county, and brown hematite is worked with an analysis similar to that given for "Cliff Forge mines," in Alleghany county. The county is very healthy.

Professor Rogers gives an analysis of the iron ore at "Bath furnace" (south of Calf Pasture river), which, I think, is in Bath county; it contains 24.62 grains peroxide iron out of 30 grains; nothing deleterious; color brown; structure compact and crystalline; ore very abundant.

BEDFORD COUNTY

Was formed from Lunenburg in 1753. It is 35 miles long and 25 wide. The soil is fertile, and produces wheat, corn, tobacco, oats, and the grass and fine stock.

The surface is uneven, and in parts mountainous. The Peaks of Otter in this county, are among the loftiest mountains in the Southern States and are much resorted to for their magnificent views.

The population is 23,327. Number of acres of land, 489,470, assessed at \$3,572,798. It has 5,000 horses and mules, 11,199 cattle, 6,424 sheep and 12,953 swine.

The productions of this county are ample for the support of its inhabitants and give large shipments to market of tobacco, the cereals, and beef and mutton. Gypsum is in general use and pays admirably well. Artificial manures are used, principally on tobacco.

The Atlantic, Mississippi and Ohio railroad passes through this county. Sheep are profitable, and bee culture is followed to some extent. Liberty, the county seat, is a flourishing town, and is considerably engaged in the manufacture of tobacco.

There is a great deal of valuable timber in this county, white oak, hickory, chestnut and walnut, growing to great size and perfection. There are large beds of valuable minerals, as granite, kaolin, ochre, iron, barytes, copper and lead. The Bedford Alum and Iron springs are in this county, near Forest depot on the Atlantic, Mississippi and Ohio railroad, and are recommended for the cure of various diseases. The apples of Bedford will compare favorably with those from the most noted apple-producing counties. The pippin is at home here as well as in Albemarle. Bedford has steadily taken the premiums of our State fairs, for several years, on apples. Grapes also succeed admirably well, and peaches very well. It is one of the richest and most productive counties in the State, being thickly settled.

and the farms producing large crops. The grazing quality of the lands is excellent, and the county produces some of the finest specimens of horses, cattle, sheep and hogs in the State. It is drained by numerous tributaries of the James and Staunton.

The second year after the *dog law* was passed the county paid to the school fund \$2,300, being the surplus after paying for sheep killed by dogs, and for fox and wolf scalps. Fields which were before grown up in broom sedge and bushes are now pastured by flocks of fine sheep, and an increasing interest for improved breeds is marked.

BLAND COUNTY.

Bland county was formed in 1861 from Wythe, Tazewell and Giles. The surface is mountainous. The soil is rich, and produces tobacco, all the cereals, and is finely adapted to grasses. The native blue-grass springs up wherever the land is cleared. The inhabitants are prosperous and raise all their supplies at home, and send to market, besides farm produce, large amounts of beef and pork.

The population is about 4,000. Number of acres of land, 205,938, assessed at \$465,924. Number of horses and mules, 1,518; cattle, 3,834; sheep, 5,599; swine, 3,934.

It is drained by streams emptying into New river. The cultivation of grass is rapidly increasing, and cattle-raising in proportion. Commercial manures are not much used; gypsum is profitably used on grass lands. Chromic iron is found in this county. It is a healthy region, particularly in summer.

One of our correspondents says "Bland affords unsurpassed advantages as a county. It occupies an intermediate position between the tobacco region of Eastern Virginia and the great grain-growing region of Kanawha, being equally adapted to the products of either. It is a fine stock-raising county, though all the grains and tobacco are raised with the most satisfactory results. Most of the fruits do well here, and apples, peaches, pears, plums and grapes are cultivated with great success. Many varieties of grape grow here spontaneously. The purity of the atmosphere, with the adaptability of the soil for the vine, will doubtless soon give our section great prominence as a wine-making country. The county is well watered with numerous creeks with ample capacity for all kinds of machinery. Timber is very plentiful. We have various kinds of unsurpassed oak, walnut, poplar, ash, hickory, pine and cherry, all in great abundance. The society of the county is excellent. The finances have been well managed, and the county is out of debt. We have a fine court-house and other public buildings. The prospect for a railroad in this county is very

flattering. The line of the Virginia, Kentucky and Ohio narrow-gauge road passes through the centre of the county. The mountains are filled with inexhaustible quantities of the finest iron ore, lead, silver, &c. Lands are very cheap, but are gradually advancing. Any one can buy land on a credit if he will go to work. Provisions have usually been cheap, corn fifty cents, wheat one dollar, bacon six to eight cents. We can assure those who desire to settle among us, if they make good citizens, that they will be received with a hospitable hand, and welcomed by that neighborly support which always makes the newcomer feel like he is at home."

BOTETOURT COUNTY

Was formed in 1770 from Augusta. Its length is 44 miles, and mean breadth 18. The Blue Ridge forms its eastern boundary, and much of the surface is mountainous. The soil is fertile, and adapted to the growth of tobacco, corn, oats and grass.

The population is 11,329. Number of acres of land 360,807, assessed at \$2,458,932. Number of horses and mules, 3,183; cattle, 6,299; sheep, 4,221, and swine, 8,030.

The grain, forage and meat produced in the county are ample for the support of its inhabitants. Lime and plaster act well on these lands. The minerals are iron ore (brown hematite), hydraulic and other limestones, coal and manganese.

There is a *very considerable* amount of wheat, corn, oats and pork or bacon shipped out of the county, and hundreds of stock cattle are annually sold. The Buchanan and Clifton Forge railroad, which would have been completed by July but for the November freshet, passes along the valley of the James river in this county, for a distance of 28 miles, and when completed will, no doubt, be the means of developing some of the finest iron deposits in the State. Five miles below Clifton Forge depot, near this railroad and in a very accessible situation, is a surface deposit of brown hematite ore forming a solid mass 300 feet long, 60 feet wide and 35 feet high; this ore yields by analysis 55 per cent. of superior iron. There is an abundance of superior limestone in the same region. There are other extensive mineral deposits along the line of this partly-built railroad, and when it is completed there is no reason why these fine and abundant ores may not be as cheaply manipulated here as upon the banks of the Ohio at Ashland or Ironton.

The James River and Kanawha canal borders a small portion of the county, and James river above the town of Buchanan (the terminus of the canal), is navigable, by batteaux, for a distance of 30 miles.

Fincastle, the county scat, is a town of seven or eight hundred inhab-

itants, and is distant 12 miles from the canal and 14 miles from Bonsack's, on the Atlantic, Mississippi and Ohio railroad. Buchanan, Pattonsburg, Amsterdam and Jackson are small villages in this county. Iron ore from Black creek, from Mr. James Wood's lower bank, as analyzed by Professor Rogers, contained 24.16 grains of protoxide of iron in the 30 grains, with no objectionable constituent; color dark chestnut, fine grained. Another specimen from Mr. Wood's upper bank contained 25 grains iron in the 30 grains. Two specimens near Catawba furnace, Crawford's mountain, contained one 24.10, the other 24.35 grains of iron (protoxide) out of 30 grains, nothing deleterious; color dark brown, texture fine grained, cellular, the cells being often coated with black velvet films.

From Crawford's mountain, hydraulic limestone is obtained with 44 per cent. carbonate lime and 25 per cent. carbonate magnesia, 22 per cent. of silica, and 4 per cent. alumina, which is highly hydraulic. The Catawba semi-bituminous coal consists of carbon, 78.50; bitumen, 16.50, and ash, 5.0.

BRUNSWICK COUNTY.

Was formed in 1721 from Surry and Isle of Wight. It is nearly a square of 26 miles on a side. The surface is undulating, and is drained by Meherrin, Notoway and Roanoke rivers. Most of the county is comprised in the valleys of these rivers, and is very productive. The soil is easily improved and produces large quantities of wheat, tobacco, corn, and some cotton. The tobacco is of very superior quality.

The population is 13,427. Acres of land 356,892, assessed at \$1,150,-143. Horses and mules, 1,994; cattle, 8,078; sheep, 3,517; swine, 9,816.

The productions largely exceed the consumption, except meat. Yield, per acre of wheat, 12 bushels; corn, 35 bushels; hay, 1½ tons. Gypsum acts well on the land, and some commercial fertilizers are used. Soapstone is found in this county. The lands are easily tilled, and yield liberally. The climate is mild and healthy, and the people well satisfied with the advantages nature has given them, and show a disposition to improve them.

BUCHANAN COUNTY

Was formed in 1858 from Tazewell and Russell. It lies on the western slope of the Alleghany mountains, its southeast border being the dividing ridge of that chain of mountains. The surface is rugged and mountainous. It is drained by the headwaters of Big Sandy river, which flow northwest into the Ohio, and is very well watered. The soil in the valleys is fertile and well suited to grass and the cereals. All of this region is

admirably adapted to grazing and the rearing of stock of all kinds. Its great elevation gives it a moist, cool climate, suited to the growth of grass. This county is rich in iron and other minerals, coal in particular being very abundant. Population, 3,775. Number of acres of land, 911,357, assessed at \$202,493.

Number of horses and mules, 850; cattle, 3,639; sheep, 5,214; swine, 6,746. This county needs a railroad to develop its very considerable resources, its nearest railroad being the Atlantic, Mississippi and Ohio railroad.

BUCKINGHAM COUNTY

Was formed in 1761 from Albemarle. It is 35 miles long, and about 24 wide. It is drained by James river on its northern and eastern boundaries, by Appomattox river on the south, and Willis' and Slate rivers, which drain the central parts. The soil is mostly gray slate, and, on the margins of the streams, is very rich. The hill lands are, for the most part, not very productive, but very improvable.

Buckingham is rich in minerals, of which gold, iron ores, slate, mica, and limestone, are the principal. The population is 13,371; number of acres of land, 441,676, valued at \$1,714,573.

It has 2,192 horses and mules; 6,632 cattle; 2,582 sheep, and 10,744 swine.

Gold mines have been worked in the county to a considerable extent, and with some profit, and if the best modes were used, no doubt it would pay well; and slate is extensively mined of very superior quality, being the best roofing slate in the world. Very superior specimens of this have been furnished my cabinet by Messrs. Edwards & Roberts, of New Canton.

This county is remarkably healthy, the society good, well supplied with churches and schools, and offers excellent inducements to immigrants. Limestone is found in the county. A specimen from James river, opposite Warminster, of *hydraulic* character, contains about 45 per cent. carbonate lime, 34 per cent. of carbonate magnesia, alumina and oxide of iron, 3.50 per cent., silica, 13.70 per cent.

CAMPBELL COUNTY

Was formed in 1781 from Bedford. It is nearly a square of twenty-five miles to a side. It lies on the south bank of James river. It is watered by the Otter and Falling rivers, tributaries to the Staunton, which give to it any quantity of water-power for manufacturing purposes. The James and Staunton rivers, the first emptying into Chesapeake bay, and the lat-

ter into the Roanoke (which empties into Albemarle sound), afford transportation for a limited amount of the productions of this county. Much the larger portion goes by railroads. The Washington City, Virginia Midland and Great Southern railroad traverses it from north to south; the Atlantic, Mississippi and Ohio railroad runs through it from east to west; and the James River and Kanawha canal on its north border, all combining to give this county peculiar advantages and facilities for markets in every direction. The surface of this county is broken and rolling. The soil is peculiarly adapted to the production of the best and most highly valued tobacco. Land is valued at from four and five to twenty dollars per acre. A large portion of the county is in original growth, and has an immense amount of most valuable timber.

The population is 28,384. It has 322,365 acres of land, assessed at \$2,184,348. The number of horses and mules is 2,772; cattle, 6,038; sheep, 2,622; swine, 7,644. Lynchburg is the largest town in the county, and is the fourth in importance in the State. The two railroads which traverse the county cross each other here, making it a fine centre of trade. There are in Lynchburg eight banks and banking-houses, four newspapers, four first-class hotels, ten churches, nine public and numerous private schools, seventy tobacco factories, and on the two levels of the adjacent canal are two rolling-mills, three foundries, two large flour-mills, two bark and extract manufactories, and numerous other enterprises.

Iron ore and gneiss are found in this county. The Birmingham iron and coal company are working in Campbell large deposits of red hematite and magnetic ore of very fine quality, capable of making excellent steel.

Limestone exists in the county. Some from Mr. Wright, near Beaver creek, contains about 67 per cent. carbonate lime, and 25 per cent. carbonate magnesia (leaving out decimals). Another specimen from Arthur's quarry, Back creek, contains about 93 per cent. carbonate lime, and only 2.44 carbonate magnesia. Another from Captain Perrow's, Beaver creek, contains of carbonate lime 55 per cent., and of carbonate magnesia, 40 per cent. Another from James river, below Archer's creek, contains 79 per cent. of carbonate lime. There are other analyses of limestone given by Professor Rogers—some eight. These mostly contain carbonate lime, varying from 59 to 88 per cent. A few miles below Lynchburg a good marble is found.

CAROLINE COUNTY

Was formed in 1727 from Essex, King & Queen, and King William. It is 30 miles long and 20 broad. It is drained by the Rappahannock, the Mattaponi, and the Pamunkey. The surface is broken, but the soil, near

the borders of the rivers, is fertile, producing large crops, particularly of corn; also wheat and tobacco. It has a population of 15,128; 324,493 acres of land, assessed at \$1,879,274. Number of horses and mules, 2,569; cattle, 5,389; sheep, 2,482, and swine, 7,596.

The productions of this county are largely in excess of the consumption. Sheep are reported to be profitable. But little "fertilizers" are used; composts are used a good deal, and some plaster (its action uncertain), both on compost and on grass. Marl exists, but not generally of good quality, and has not been much used. This is a great corn county, and several farmers, in times past, have amassed considerable fortunes by its cultivation.

It is one of the best watered counties in the State. Its northeast border is formed by the Rappahannock river, which separates it from King George county; North Anna river separates it from Hanover, and unites near the southeast corner with South Anna river, forming the Pamunkey river. The central part is drained by the Mattaponi and its branches. These streams, with their numerous creeks flowing in various directions, afford much fine bottom land, which is very productive, particularly for corn, besides they give fine water-power and mill-sites. The Richmond, Fredericksburg and Potomac railroad passes through the central part of the county. Bowling Green, the county seat, is a flourishing village, situated near the centre of the county. Large numbers of northern settlers have settled in this county since the war, and as far as we learn are well pleased.

CARROLL COUNTY

Was formed in 1842 from the northeast part of Grayson. It is a mountainous region, watered by New river and the headwaters of the Holston. It is a grazing and stock county. The chief products are tobacco, wheat, corn, rye, buckwheat, oats, and grass. Large quantities of cattle and sheep are also raised in this county. The population is 9,147; number of acres of land, 355,731, assessed at \$585,184. It has 2,096 horses, 8,044 cattle, 10,361 sheep, and 12,007 swine. The farm products are ample for the use of the inhabitants. Sheep raising is profitable. Very little fertilizer is used. Gypsum pays, as does lime also. Per cent. of high land, 90.; bottom, 10. Number of acres in timber, 128,000. Varieties of timber: All the oaks, chestnut, white and yellow pine, walnut, hickory, dogwood, &c. Principal streams: New river, Big and Little Reed Island creeks, Chestnut, Crooked, Banks, Jank, Laurel and Smoke creeks—water-power abundant. Factories: 3 iron, 2 tin, and 3 wagon. Number of acres in cultivation, about one-third of area of the county. In wheat, 2,000 acres; average yield, 7 bushels. Tobacco, 200 acres; average yield, 500 pounds.

Oats, 5,000; average yield, 15 bushels. Buckwheat, 500 acres; yield 15 bushels. Irish potatoes, 150; yield, 200 bushels. Sweet potatoes, 50; yield 200 bushels. Clover, 5,000; orchard grass, 20,000. Orchards, 400. There are 40 schools—39 public and 1 private. There are 10 churches; 5 are Baptist, 3 Methodist, and 2 Presbyterian. Number of immigrants in the last five years, 300. This county is a fine region, and its only deficiency is railroad facilities. There are many fine minerals in this county—iron, copper, zinc, lead, steatite, &c. Lands sell from \$4 to \$14 per acre. Hillsville, the county seat, is a thriving town, located in a fertile valley. This county is in the section of Virginia celebrated for producing a fine quality of bright tobacco.

CHARLES CITY COUNTY

Was one of the original shires of Virginia, established in 1634. This county lies in the peninsula formed by the Chickahominy and James. It is 30 miles long, with a breadth of 5 to 14 miles. The surface is gently undulating or level. The soil adjacent to the rivers is very rich and productive. Its productions are chiefly corn and wheat. The timber is oak, hickory and pine. Large quantities of ship timber and cord wood are annually shipped from this county.

The population is 4,975. Number of acres of land, 112,204, assessed at \$656,526. It has 977 horses and mules, 1,899 cattle, 1,083 sheep, and 4,349 swine.

COMPOSITION OF EOCENE MARL IN THIS COUNTY.

Berkeley—Silica, alumina, &c.....	50 per cent
Green sand.....	50 per cent.

MIOCENE MARLS.

		Per cent. of carb. lime.
Herring Creek—Light shells generally decomposed, slightly compact, intermixed with green sand.....		87.5
Do.	do.	50.0
Do.	do.	50.0

CHARLOTTE COUNTY

Was formed in 1765 from Lunenburg. It is 22 miles long, with a mean breadth of 18 miles. The surface is rolling. It lies on Staunton river, which separates it from Halifax. It is watered by the tributaries of Staunton and Meherrin rivers. Soil on the rivers is very rich. The hill lands produce very good crops, and are easily improved.

The population is 14,513. Number of acres of land, 301,031, assessed at \$1,882,696. It has 2,250 horses and mules, 5,072 cattle, 2,751 sheep,

and 7,155 swine. The productions of the county are sufficient for the support of its inhabitants. Tobacco and wheat are the money crops. The Richmond and Danville railroad passes through the county. The Atlantic, Mississippi and Ohio railroad touches its northern boundary. The principal crops are wheat, corn, oats and tobacco. Wheat on clover fallow, or after tobacco, yields from twelve to twenty bushels per acre. Corn on unimproved hill lands, from fifteen to twenty bushels, and the bottom lands, thirty to forty bushels. Winter oats on the hill lands and spring oats on the bottom lands yield full returns. Red-top and orchard grass grow well on the hills, and clover and timothy make from one and a half to two and a half tons of hay on the bottom lands. The high reputation of its tobacco has made it the leading crop, much to the neglect of the grasses and other crops. All the fruits and vegetables grown in any part of the State do well in this county.

Most of the forest land is heavily timbered with white oak, red, Spanish, black and chestnut oak, yellow pine, hickory, dogwood, &c., on the hills, and white oak, white ash, maple, sweet-gum, elm, hickory and sycamore on the bottom lands. There is considerable immigration to the county. During the present year, 1878, a Pennsylvania company has purchased some eight thousand acres of land in the county, which is being rapidly disposed of to settlers in farms of from fifty to one hundred acres. The county is very healthy.

CHESTERFIELD COUNTY

Was formed from Henrico in 1748. It is 28 miles long, and 18 miles wide. The surface is rolling. The soil, light and gray in color, easily improved. The James forms its northern and the Appomattox its southern boundary. The lands on these streams are alluvial, and very rich.

The county is well watered and intersected by important railway lines. The population is 18,470. Number of acres of land, 293,142, assessed at \$3,216,479. It has 1,955 horses and mules, 3,428 cattle, 2,845 sheep, and swine, 6,182.

The people raise all their home supplies, and sell wheat, corn and tobacco. Marl exists in the lower end of the county, but we are not informed regarding its use. This county contains a good amount of timber.

This county has inexhaustible mines of bituminous coal, and extensive quarries of superior granite in active operation.

Manchester, the principal town, has two cotton mills, several flouring mills, one paper mill, one bucket factory, iron works, the machine shops of the Richmond and Danville railroad, and several other manufactories, besides the extensive granite works of the Federal government, and is con-

nected with Richmond by two bridges across the James. The coal of Chesterfield is celebrated as a very rich gas coal; the principal mines are the Midlothian, *Bright Hope, Black Heath and Winterpock. The Richmond and Danville railroad and the Richmond and Petersburg railroad cross the James at Manchester on two fine bridges, and pass south through this county, and short railways from the coal mines in the western part of the county run eastwardly, intersecting the main lines, and bring their products to the James river, below Manchester, and to the Appomattox, below Petersburg, at points of shipment,

MIOCENE MARLS.

Chesterfield.	Per cent. of carb. lime.	
Mrs. Cocke's—Indurated, containing impressions of shells and small decomposed shells intermixed with green sand.....	-	60.2
Second Sample, do. do.		76.1

CLARKE COUNTY

Was formed in 1836 from Frederick. It is 17 miles long and 15 wide. The surface is undulating and mountainous, with extensive valleys of most fertile soil. It lies in the valley of the Shenandoah river, and is one of the finest wheat-growing counties in the State. It belongs to the limestone formation, and abounds in various minerals, the chief of which are iron ore and limestone. Copper and lead are also found in this county. The raising and fattening of cattle for market is very extensively carried on. Numbers of flouring mills are located in this county, manufacturing flour extensively for the Baltimore and other markets. Population in 1870 was 6,670. Number of acres of land 108,929, assessed at \$2,447,782; horses and mules, 2,815; cattle, 3,707; sheep, 10,950; swine, 6,368. The farm crops are ample for the support of the population, and afford a large surplus for market. Bee culture is found to be very profitable, and is largely followed—some farmers having two to three hundred stands, and realizing \$500 to \$1,000 from the sale of honey. \$11,000 to \$12,000 sheep, and 1,000 head of fat cattle are sold annually from this county. Lime burned from the native rocks is beneficially used on land. Gypsum and commercial fertilizers are in general use. Fruits of all kinds are raised, and some of them profitably, particularly apples. The Valley railroad and a turnpike traverse this county, and the Washington and Ohio

*The Bright Hope has a railroad from thence to James river, twenty-one miles, crossing Richmond and Petersburg railroad at Chester, giving a market to Richmond and Petersburg, and at Osborne, on the river, large sized vessels take on this coal for foreign markets. Recently the output of these mines has not exceeded 100 tons per day, but could be easily doubled if required. Statistics of the other mines are given in a former part of this work.

railroad has been completed very near to its border. This is a healthy section, the summer climate particularly being very fine. The county contains some very fine farms and excellent and enlightened farmers. The average assessed value of the lands per acre is \$21.75.

CRAIG COUNTY

Was formed in 1850 from portions of Botetourt, Roanoke, Giles and Monroe. The surface is mountainous and broken, like all the Appalachian region—land well suited to the growth of the grasses, and chiefly valuable for grazing and stock, which is of fine quality. It contains 259,404 acres of land, assessed at \$505,305. The population is 2,942. The farm animals are: 1,221 horses and mules; 3,557 cattle; 3,085 sheep; 3,963 swine.

It has five manufacturing establishments, with \$11,400 invested. It is drained by Pott's, John's, Craig's, Barber's and Sinking creeks, which afford ample water-powers. This county contains the fine oaks, ash and hickory that belong to Appalachia generally. These timbers are noted for their hardness and great strength. Professor Brewer, quoted by Hotchkiss, says: "It is believed that white oak attains its greatest development of strength in certain parts of Virginia and West Virginia. This is a matter of great importance in ship-building and boat-building, and in the manufacture of railroad cars and agricultural implements."

The county contains iron ores, manganese, and slate suitable for mantels, and there is said to be silver.

CULPEPER COUNTY

Was formed in 1748 from Orange. It is 20 miles long and about 18 in width. The surface is undulating. The soil is about equally divided between heavy clay, sandy gray, and gravelly. Productions: tobacco, wheat, corn, oats, hay, beef, mutton, lambs and wool. It is drained by the Rapahannock and Rapidan rivers, and their tributaries. The population is 12,227. Number of acres of land, 232,545, assessed at \$2,402,297. Number of horses and mules, 3,248; cattle, 8,087; sheep, 17,047; swine, 14,069. The farmers use artificial manures and gypsum very generally. This is a good fruit county, including grapes; it is self-sustaining in all farm products. It is a good grass county—clover, timothy, orchard grass, Randall grass, Herd's grass and blue grass do well. Bees are raised to some extent. The Washington City, Virginia Midland and Great Southern railroad passes through this county. The water-power is abundant. Health of the county most excellent. High land, 75 per cent.; bottoms,

25 per cent. About two-fifths of the county is in timber, consisting of walnut, ash, hickory, the oaks, locust, pine, cedar, chestnut, maple, &c. Minerals: magnetic and hematite iron ores, and gold. About one-half the land is cultivated, or 116,277 acres. Wheat acreage, 29,029; yield, 10 bushels. Oat acreage, 19,379; yield, 16 bushels. There are two newspapers, twenty-one schools, seven Baptist churches, six Episcopal churches, six Methodist churches, and one Presbyterian church. One bank. Number of immigrants in the last five years, 220, of which number about 200 are from Europe.

Culpeper Courthouse is a thriving village of 1,500 inhabitants.

CUMBERLAND COUNTY

Was formed in 1748 from Goochland. It is 32 miles long and about 10 broad, with the Appomattox river running on its south, the James on its north boundary, and Willis' river through its northwest part; the Atlantic, Mississippi and Ohio railroad runs through a portion of its southern border. The surface is undulating, and the soil productive. Population, 8,142. Number of acres of land, 188,520, assessed at \$1,229,617. Number of horses and mules, 1,500; cattle, 3,953; sheep, 1,838, and swine, 5,066. The farmers raise all their supplies except bacon. The products are tobacco, wheat, corn and oats. The cultivated grasses, particularly clover, succeed admirably when the soil has been improved.

The soil is very good, with generally a red clay sub-soil, and is capable of being made very productive. The lands on the rivers are very fertile. No county in the State, probably, is more healthy than this, and the inhabitants have every reason to be satisfied with their homes, and persons seeking new homes will find many inducements here.

Cartersville, on the James, is the principal village, and much of the produce of the county is shipped from this point.

DINWIDDIE COUNTY

Was formed in 1752 from Prince George. It is hexagonal in form, with a width of about 28 miles. The surface is part undulating, but mostly level. The soil of the undulating portion is rich clay loam, susceptible of the highest state of improvement. The other portion is sandy, but not very light. The Appomattox on the north boundary, and the Nottoway on the south, with their tributaries, give ample drainage to the county, with fertile bottoms.

Population, 11,722; number of acres of land, 315,491, assessed at \$1,235,525; has 1,649 horses and mules, 1,505 sheep, 3,972 cattle, and 5,383 swine.

The productions are corn, wheat, tobacco, cotton, oats, peanuts, potatoes, melons, and vegetables of almost every variety, for the Petersburg and other markets. The products of the farm are ample for the inhabitants, except in the article of meat. Commercial manures are largely used. There is marl in the northeastern portion of the county, which is used to some extent, with very beneficial effects. All the clovers and grasses flourish well on the enriched lots and on the bottom lands. The per cent. of high land is 75. It has 205,000 acres in timber, consisting of oak, hickory, dogwood, walnut, ash, persimmon, elm, poplar, and a large percentage of pine, original and second growth.

Number of public schools, 38. Churches—13 Methodist, 2 Episcopal, 2 Baptist, 1 Presbyterian, 1 Reformed, and 8 or 10 colored (Baptist) churches.

At Mayfield, in this county, there is an immense quantity of *granite*, said to be of the best quality and susceptible of the finest polish.

These quarries have been worked for the last fifty years. Granite of fine quality is also found on the Booth farm, immediately on the line of the Atlantic, Mississippi and Ohio railroad.

Several veins of hematite and one of magnetic iron ore crop out in different portions of the county.

Petersburg, in this county, is an important railroad centre, and a large cotton and tobacco market.

The Atlantic, Mississippi and Ohio railroad from Norfolk to Bristol-Goodson, passes through the city, and has extensive depots and machine shops, and a branch road to City Point, on the James. The Petersburg and Weldon, and the Richmond and Petersburg roads have terminal points with depots and machine shops here. The Appomattox river is navigable to this point for steamers, and furnishes valuable water-power for the various manufactories adjacent to the city, principally cotton. Petersburg is a considerable cotton and tobacco port, and has many tobacco factories. The population of Petersburg in 1870 was 18,950.

ELIZABETH CITY COUNTY

Was one of the eight original shires into which Virginia was divided in 1634. Its form is nearly a square of 7 miles on a side. It lies on Hampton roads and Chesapeake bay, and is intersected by several creeks. The surface is level, and the soil fertile, some of it highly so. The population is 8,303. Number of acres of land, 32,862, assessed at \$781,554. Horses and mules, 635; cattle, 1,409; sheep, 643; swine, 2,052. There are 15,000 acres in timber, consisting of pine, gum, oak, ash and poplar. Wheat acreage, 1-10—yield, 12 bushels to acre; oats, 2-10—yield, 15 bushels; potatoes, 1-10—yield 75 bushels; in orchard, 2-100—apples,

pears, peaches, figs, plums, &c. Corn acreage, 50-100—yield, 20 bushels. Number of schools, 3 (public); churches, 3 (Baptist). The productions are corn, wheat and potatoes. The farm products are ample for the inhabitants. The supplies of fish and oysters are abundant. There are no railroads in this county, as it is penetrated and almost surrounded by navigable waters. The land is easily cultivated, and living cheap and abundant, and the people well contented with their advantages. "Trucks" are considerably raised. Hampton is a flourishing town, the seat of that noble institution, the "Hampton Normal and Agricultural Institute." It is designed for the education of colored youths received from the lower schools of the state, and is now very prosperous. It is supported by land-script donated to the State of Virginia by the general government, and was founded in 1870. The general government has lately made an appropriation for the education here of fifty Indian youths, which have probably been received by this time. An experiment in educating a small number (fifteen) here last year, has been very successful and gratifying. They have gotten along well with the colored youths. This institution is doing an admirable work for the State and the country at large.

ESSEX COUNTY

Was formed in 1692 from Rappahannock county, the records of the original county extending back to about 1620, remaining in this county. It lies on the southside of the Rappahannock river, about 45 miles northeast of Richmond. It is about 48 miles long and 10 miles wide. It is well watered by numerous tributaries of the Rappahannock river, some of which are navigable. Rappahannock river is well stocked with fish of all kinds common to this latitude, and oysters, and is navigable to the city of Fredericksburg, which is about 55 miles above Tappahannock, the county seat. The surface is generally level or slightly rolling. The river lands are, where properly drained, very productive and valuable. Back from the river the soil is more sandy, but productive. The productions are corn, wheat, oats, rye and potatoes, sweet and Irish (for sale). Peanuts might be profitably cultivated. Tobacco has been, to a small extent, since the war, profitably raised. A very heavy traffic in pine lumber has been for several years (and is still being) carried on. Marl is abundant in many parts of the county, and was, prior to the war, profitably applied; but, since the abolition of slavery, has been but little used. Good land can be bought at from \$5 to \$10 per acre, and no part of Virginia offers better inducements for immigration. Gypsum and lime act well on the land. Commercial manures are used, and grasses succeed well. The county is self-sustaining, except as to meats, and is improving as to that; prior

to the war it was fully so, with some to spare. On Dragon swamp, which separates it from King & Queen, are some fine wheat lands, with a heavy, tenacious soil of great fertility. There are some fine farming lands in Essex, and it was once the seat of great wealth. Since the war, and liberation of the slaves, many of the wealthiest families have been greatly reduced in circumstances, but they are getting better accustomed to the new state of things, and are working up again as fast as hard times and bad crops will permit. This county produces fine crops of corn, wheat, oats and tobacco, and is very accessible to market. Number of farm animals: Horses and mules, 1,209; cattle, 4,138; sheep, 1,872; swine, 5,395.

Four specimens of marl in this county contain an average of 50.70 per cent. carbonate of lime.

FAIRFAX COUNTY

Was formed in 1742 from Prince William. It lies on the Potomac river, and adjoins Alexandria county. The county is watered by the Potomac and the Occoquan, and their tributaries. The surface is generally rolling, and the soil a sandy and clay loam, and in some parts very fertile. The population is 12,952. Number of acres of land, 284,417, assessed at \$4,269,698. Number of horses and mules, 3,731; cattle, 5,926; sheep, 3,306, and swine, 6,248.

The productions largely exceed the consumption of the citizens, and consist, principally, of corn, wheat, oats, rye, hay, fruits, dairy products, and vegetables. Its proximity to Washington city, Georgetown and Alexandria, ensures a ready demand for all the productions of the farm, dairy, and garden. The land is mostly owned in small farms, and is in a high state of cultivation. Many families from the Northern and Western States have settled in this county since the war. The number of new settlers is stated at "six hundred families." Artificial manures, lime and gypsum, are in general use. Most of the soil is well adapted to grass. Bees, sheep and poultry are reported to be profitable. The per cent. of high land, 90; bottom, 10. Acres in timber, 160,000; varieties—pine, oak, chestnut, cedar, locust, walnut. Number of acres cultivated, 100,000. In wheat, 10,000; yield, 18 bushels. Oats, 5,000; yield, 25 bushels. Buckwheat, 500; yield, 20 bushels. Potatoes, 3,000; yield, 75 bushels. Grass, 30,000; yield, 1 to 2 tons. Orchards, 3,000; varieties—apples, pears, peaches, grapes and nectarines. Number of stands of bees, 3,000, valued at \$15,000. There are 61 public schools in a prosperous condition. One newspaper is published in the county, "*The Fairfax Messenger*." There are 41 churches, of which 30 are Methodist, 4 Baptist, 3 Presbyterian, 2 Catholic, 1 Congregationalist, and 1 Friends. There are 30 vineyards, embracing 100 acres.

The court-house is situated near the centre of the county, and is a thriving village. It was nearly destroyed by the ravages of the late war, but has long since recovered from that disaster. Mount Vernon, the former residence of Washington, is situated in this county, on the banks of the Potomac river, eight miles below Alexandria. The grounds are in charge of the Mount Vernon Association, and are visited every year by thousands of persons from all parts of the world.

Soapstone and iron are found in Fairfax.

A contract has been let for the completion of the Washington, Cincinnati and St. Louis narrow-gauge railroad from Georgetown to Fall's Church, in Fairfax, and it is expected to be completed in sixty days.

FAUQUIER COUNTY

Was formed in 1759 from Prince William. Its length is 45 miles, mean breadth 16 miles. The surface is gently rolling, and in some parts hilly. The hill lands have a red-clay soil; the level lands are gray sandstone. The lands are fertile, and produce fine crops of corn, wheat, oats, rye and grass. It is watered by the Rappahannock, Occoquan, and numerous creeks throughout its entire surface, furnishing many eligible sites for mills and manufacturing purposes. The timber is oak, hickory, chestnut, walnut, poplar, locust, ash, cherry, cedar, sycamore, sassafras, elm, gum, mulberry, dogwood and pine. There are 33 mills in the county. The population is 16,690. Number of acres of land, 412,110, assessed at \$7,698,486. Number of horses and mules, 6,845; cattle, 23,755; sheep, 23,125; swine, 16,693. The productions of the county are ample for the support of its inhabitants, and furnish a large surplus for market. This is one of the healthiest and most prosperous counties in the State. The Washington City, Virginia Midland and Great Southern railroad have thirteen stations in this beautiful and fruitful county, viz: Catlett's, Warrenton Junction, Bealton, and Rappahannock on the main line; Melrose and Warrenton on the Warrenton branch; Broad Run, Plains, Salem, Rectortown, Piedmont, and Markham on the Manassas division; making in all about 60 miles of railway through a region unsurpassed for its mineral, agricultural and manufacturing capacities.

Fauquier has gold, iron ore, marble and asbestos.

FLOYD COUNTY

Was formed in 1830 from Montgomery. It is 38 miles long, with a mean width of 18 miles. It is surrounded by the counties of Patrick, Carroll, Pulaski, Montgomery and Franklin, and lies between two prominent ranges

of the Alleghany mountains. The surface is rolling, the soil is fertile and well adapted to the grains and grasses. The products are tobacco, wheat, corn, oats, hay. Many fine horses, mules, cattle, sheep and hogs are raised in this county. The finer grades of tobacco are raised here, and bring considerable revenue to the county. Its productions are ample for the use of its people, and furnish a large surplus for market. It is watered by the Little river, a branch of New river. This is an elevated and healthy region and possesses a delightful summer climate. The population is 12,000. It has 239,415 acres of land, assessed at \$1,017,397. The number of horses and mules, 2,447; cattle, 7,972; sheep, 8,689, and swine, 18,474. Fruit raising is profitable. Its nearest railroad is the Atlantic, Mississippi and Ohio railroad, passing through the adjoining county of Montgomery. The timber consists of white oak, red oak, black oak, chestnut oak, hickory, white ash, pine, walnut, dogwood, maple, black gum and chestnut. About one-half the area of the county is in original forest timber of the varieties named. Indications of minerals are found in different localities. Lead and iron, copper, yellow and blue ochre, also a very fine quality of soapstone in large quantities, are found in the county.

FLUVANNA COUNTY

Was formed in 1777 from Albemarle. It is 26 miles long and 16 miles wide. The surface is rolling. The soil on the rivers and creeks is very fine. The hill lands produce fine tobacco when fertilized. It is drained by the James river on its south border, and Rivanna, which passes through the centre, and their numerous tributaries. James River and Kanawha canal passes through it. From Columbia the Rivanna canal passes through the central part of the county up the Rivanna river as far as Union Mills where it meets slackwater navigation, reaching to Buck Island. About six miles of the Rivanna canal is owned by the James River and Kanawha company, and will pass to the Richmond and Alleghany railroad company by the bill now before the Legislature, but in case that company fails to keep it up, they are required by an amendment proposed by Mr. A. Taylor, the member from that county, to build a railroad in lieu of the canal.

The timber is oak, hickory, walnut, poplar, beech, birch, pine and dogwood. The productions are wheat, corn, oats and tobacco. The last is the main money crop, and is of superior quality. The population is 9,800. Number of acres of land, 179,912, assessed at \$1,287,930. Number of horses and mules, 1,581; cattle, 3,642; sheep, 1,893, and swine, 4,200. This county produces a large surplus of the main crops for market. The lands are cheap, and the health of this county is as good as any in the State.

ate. Here, and all through this part of Virginia, cheap homes, a kind and hospitable people and good health invite settlers from the more inhospitable climates of the North and West and from across the ocean.

A correspondent says: "There is in this county an abundance of good wood suitable for various mechanical purposes. There is some white ash, small quantities though, some splendid bodies of white oak, and there it remains, in some sections, some fine pine timber."

Gold quartz has been found in many parts of the county, said to be very rich. Mr. Kirtley, of Wilmington, has sent me specimens from thirty different localities. Mr. Ryalls has also placed me under obligations for gold specimens. Dr. William B. Gray gives me the following account of gold mining in this county:

"The 'Bertha and Edith' gold mine, near Columbia, now have extensive machinery (estimated at \$50,000), being erected on the property preparatory to extensive operations. Mr. Grant, of Columbia, is the president of the company.

"The Tellurium gold mine, in this and the adjoining county of Goochland, is the property of the Columbia Gold Mining Company. Hon. A. M. Bailey, president, of Richmond, has a ten stamp California mill. It works from ten to forty hands, and is under the supervision of a Welshman. Under other management its ore yielded for 14 years \$100 per ton, and for five years, under a new management, \$20 per ton. It is the oldest gold mine in Virginia, and some 2,000 acres adjoin it, which are partially developed and of high grade ores. The mine consists of 344 acres. There are thousands of acres of undeveloped gold property within this district. The old belt embraces Buckingham, Fluvanna, Goochland, Louisa, Fauquier, Culpeper, Rappahannock, Appomattox, Halifax, Franklin and Spotsylvania counties, and the ores will surely average \$8 minimum. Professor Lowe, of the Ellis mine, Culpeper county, publishes 'total expenses of mining and milling at the Ellis may be put at \$2.20 per ton.' Ore worth \$10 per ton in Virginia will pay a profit, while in California \$8.26 will be necessary to pay expenses."

Mr. Luther R. Payne, county surveyor, writes that "iron ore has been found, some of it magnetic iron ore, said by Professor Taylor, State chemist, to be very rich; also brown hematite. There is an abundance of mills for manufacturing flour and grinding corn, also one sumac mill at Columbia."

We received from one of our correspondents a letter containing further description of this county, which, we regret to say, was lost.

FRANKLIN COUNTY

Was formed in 1784 from Henry and Bedford. It is 30 miles long and about 20 miles wide. The Roanoke river runs on its south border, and the county is intersected by numerous creeks. The surface is rolling; the Blue Ridge forms its western boundary. The soil is very fertile, and produces large crops of tobacco, corn, wheat, hay and oats. The population is 18,264. Number of acres of land, 434,140, assessed at \$1,994,451. Number of horses and mules, 4,112; cattle, 9,706; sheep, 7,731; swine, 13,387.

This county is self-sustaining in all farm products except meat. Tobacco is the main crop raised. It is a healthy county. Good land can be bought at \$4 to \$10 per acre.

This county, as all *Piedmont*, is an excellent fruit region, particularly adapted to apples and grapes. The nearest railroad is the Virginia Midland, passing through an adjoining county.

The minerals are iron, limestone and soapstone. This is a good grass and stock region, and only needs a railroad to develop its excellent resources.

Limestone, near Brook's, shows a percentage of 64 of carbonate lime.

A contract has been let for building a narrow-gauge railroad from Rocky Mount, the county seat of Franklin, to Ward's Springs, in Pittsylvania, on the Richmond and Danville railroad.

FREDERICK COUNTY

Was formed in 1738 from Orange. It is 25 miles long and about 18 miles wide. It lies in the Valley of Virginia, and is noted for its fine lands and good farming. The surface is undulating, and the soil very rich and productive. The eastern portion has a belt of gray slate land about six miles wide and running the entire length of the county on the line of Clarke. This soil produces fine crops of grain and grasses. The timber here is pine, oak, hickory and ash. The limestone belt, which is four to eight miles wide, is one of the finest and most productive sections in the State. West of this valley is the "Little North Mountain;" between it and the "Big North Mountain" is a valley about six miles wide of limestone land. In this valley are some valuable lands and fine farms. The timber in the limestone belts consist of finely grown trees of oak, hickory, walnut, ash and elm. Marl, or travertine, exists in the limestone veins. In the North mountain are extensive deposits of iron ore of the finest quality, which was successfully worked with several furnaces up to the beginning of the

war. Coal of anthracite character is also found. West of North mountain the land is generally slaty, with some gray sand, which produces well. Rock Enon Springs, on the west of North mountain, and Jordan White Sulphur Springs, five miles from Winchester, have considerable reputation for the cure of disease, and are liberally patronized. The water of the Jordan Springs is very much like that of Greenbrier White Sulphur, and it is used in the same class of diseases. The chief productions of this county are wheat, rye, buckwheat, oats and the grasses.

Winchester is the largest town, and has a population of about 5,000. There are several smaller towns (White Hall, Stephensburg, Black Creek and Cedar Creek), beautifully located on the banks of the valley streams which flow from the adjacent hills and mountains, and furnish many eligible mill sites. It is drained by Opequan, Sleepy and Back creeks, which flow into the Potomac. The population is 16,600. Number of acres of land, 267,863, assessed at \$2,435,877. It has 4,606 horses and mules, 7,177 cattle, 11,779 sheep, and 9,412 swine.

Within a radius of 25 miles from Winchester are embraced some of the best lands of the Shenandoah Valley. Soil, climate and air combine to make this one of the healthiest regions in the world, and it abounds in clear streams and running water. Within the county of Frederick, and at an average distance of eight miles from Winchester, are 37 flour mills, with an aggregate capacity of 682 barrels of flour per day. There are seven woolen mills, eight tanneries, one steam paper mill, one bone dust and fertilizer factory, one shumac and bark mill, two iron foundries, a shoe factory, glove factory, agricultural implement factory, and a number of minor operations are in successful prosecution, or about to be undertaken, in and around Winchester. Among those contemplated are a large steam flour mill, with capacity for 100 barrels of flour per day, a soap factory, &c. * * The county has no public debt, and its parish house is self-supporting. * * * The number of free schools in the county is, white, 47; colored, 4. Number of teachers, white, 51; colored, 3. Average attendance, white, 1,514; colored, 145." (Committee of Trade of Winchester.)

GILES COUNTY

Was formed in 1806, from Montgomery, Tazewell and Monroe, and lies on the western boundary of the State, with Craig on the north and Bland on the south. The eastern and western portions of the county are mountainous, both the boundaries being formed by ranges of the Alleghany mountains. Some portions of the county are very fertile, producing fine

crops of the cereals and grasses. This county is a fine grazing region and produces some of the finest fat cattle that are sent to the eastern markets. There are several mineral springs in this county, places of popular resort during the heated term, the most noted being the "New River White." It is drained by New river and its tributaries. The population is 5,900. Number of acres of land, 223,715, valued at \$1,150,300; horses and mules, 2,013; cattle, 5,577; sheep, 4,772; swine, 7,511. It abounds in fine growths of the usual timber of this region, and in beds of iron ores, copper and coal. It is not traversed by any railroad, its nearest road being the Atlantic, Mississippi and Ohio, passing through the adjoining county of Pulaski.

In Giles there is found red marble, near Chapman's ferry, and near the base of Angels Rest mountain. Hydraulic limestone, near Chapman's ferry, contains of carbonate lime 43 per cent., and of carbonate magnesia about 35 per cent; silica, 17.30, and 2 per cent. alumina and oxide iron. That a little below Chapman's ferry has 53 per cent. of carbonate lime, 43 per cent. of magnesia, and 2 per cent. silica, and 0.50 alumina and oxide iron. These are highly hydraulic.

GLOUCESTER COUNTY

Was formed in 1661 from York. It lies on the Chesapeake bay and York river. The surface is level; soil, for the most part, sandy and productive. It is 30 miles long and about 10 wide. It is drained by numerous creeks and estuaries, and is famed for oysters and fish, which form an important item of revenue to the inhabitants. The farm products are corn, wheat, oats, potatoes and other vegetables.

The population is 10,211. Number of acres of land, 134,115, assessed at \$1,194,786. Number of horses and mules, 1,524; cattle, 5,352; sheep, 2,285; swine, 6,710.

A portion of the soil in this county is stiff clay loam, which produces the best wheat. Sheep husbandry is found to pay 100 per cent. profit. Lands vary in price from \$2 to \$40 per acre. Artificial fertilizers are used to considerable extent. There is an abundance of marl in this county which was extensively used before the war. The people think its use is too costly at this time, as much of it is difficult to get out; but, as time improves, and capital increases, no doubt it will again be applied to the lands.

MIOCENE MARLS.

Observations.

Localities in Gloucester containing Marl.	General Character.	Percent. of Carbonate Lime.
Pointer's.....	Yellow clay.....	50.0
Berts' Mill.....	{ Upper stratum, containing frag- } ments of shells.....	34.0
Gloucester Town.....	Shells decomposed.....	40.9
Billups'.....	{ White, shells decomposed; green } sand, a trace.....	37.5
A. Thurston's.....	Shells decomposed.....	60.2
R. Persill's.....	{ Fragments of shells cemented; } green sand, a trace.....	71.5
Robins' Mill.....	{ Blue, tenacious; shells decom- } posed; green sand, a trace.....	39.7
Es' Mill.....	{ Upper stratum, white; shells very } much decomposed.....	51.1
Beverage's.....	{ Shells much broken; green sand, a } trace.....	57.9
near Robins' Mill.....	{ Consisting chiefly of broken frag- } ments of shell.....	30.6
Beverage's.....	{ Small fragments of shell, greenish; } green sand, a trace.....	42.0
Gloucester Town.....	{ Small fragments, richly specked } with green sand.....	41.5
Oliver's.....	{ Small fragments; green sand, a } trace.....	73.6
on road between Gloucester C. H. and } Gloucester Town.....	In nodules.....	51.1
Wharhouse Creek Bridge.....	Fragments of shell.....	46.5
Billups'.....	{ White, decomposed; green sand, a } trace.....	51.1
Walter Jones'.....	White sandy marl.....	37.1
Walter Jones'.....	{ White clay marl, with a little green } sand.....	61.5
W. Fauntleroy.....	White pulverulent.....	60.0
W. Fauntleroy (several feet below the } surface).....	Fine chalky; few traces of shells.....	96.8
on same bed, near the surface.....	More arenaceous.....	61.8
Taliaferro.....	From gray, low grounds.....	40.0
do.	Black, low grounds.....	68.1
do.	High lands, upper stratum.....	57.2
do.	{ High lands, lower level, with a lit- } tle green sand.....	35.9

GOOCHLAND COUNTY

Was formed in 1727 from Henrico. It is 40 miles long and about 10 miles wide. It lies on the north side of James river, in its entire length. The surface is undulating. The soil on the river and creeks is very rich; on the ridges not so good, but easily reclaimed from the effects of former bad farming. It produces large crops of tobacco, corn, wheat, oats and hay.

The population is 10,313. Number of acres of land, 170,382, assessed at \$1,435,048. Number of horses and mules, 1,508; cattle, 3,459; sheep, 2,227; swine, 5,072.

Good land can be bought for \$12: on the ridges, where it is generally not good, from \$2 to \$5. The James River and Kanawha canal, running through its length of 40 miles, furnishes water transportation for the farm products. The health of the county is excellent. It is drained by several large and many smaller creeks, which empty into the James. Fertilizers are used, particularly on tobacco.

In this county are found gold, iron ore, copper and coal. There are seven gold mines and two coal mines in the county. The soil is a gray or chocolate loam, resting on a tenaceous red clay subsoil, and is noted for its large and excellent crops of wheat. The fruit raised here is very good. Many Northern men have purchased lands and settled in this county, and are well pleased with it. Besides gold, iron and coal, several other minerals are found here, as granite, plumbago and asbestos. The county seat, near the centre of the county, is 30 miles from Richmond, and is a thriving village.

Analysis of kaolin on the farm of Mr. Triplett, in Goochland county, from Professor Rogers:

In 20 grains: Silica, 10.76; alumina, 6.00; water, 2.90; loss, .34.

In Goochland, Cumberland, Buckingham, and other counties similarly situated, the porcelain earth occurs in extensive beds, and in available conditions. Professor Rogers thinks this fact, taken in connection with the known existence of feldspar in the same region, points to the introduction, at no distant day, of an important branch of manufacture in the State—the fabrication of the finer description of china or porcelain, in which such excellence has been attained by the employment of similar materials in Pennsylvania.

The western borders of this region are marked by the occurrence of talcose and argillaceous slates, micaceous and garnet slates, chlorite slates, steatites, various modified rocks, and numerous veins of auriferous quartz. These auriferous veins have been successfully worked in many places in Pennsylvania, Orange, Louisa, Fluvanna and Buckingham. Sulphuret of

iron (pyrites) is an accompanying mineral, which, in many mines, occurs in considerable quantities. At Morton's mine, in Buckingham, it is peculiarly abundant, and there, as in many places, generally contains a portion of combined gold. In the Union mine on the Rappahannock, some of the auriferous veins consist largely of the pyrites, which here contain so much of the precious metal as to render the extraction of it an object of profit.

A mineral of considerable value is now being developed at a point in this county, within a few hundred yards of the James River and Kanawha canal, composed of mica, plumbago and talc. This is a fire-proof material, and is used for backs, jams and paint.

GRAYSON COUNTY

Was formed in 1792 from Wythe. It borders on the North Carolina line, and is bounded by Smyth, Wythe and Carroll. The western portion is mountainous, but its eastern and central parts is a fertile valley, and comprises a fine farming section. The productions are corn, wheat, oats, &c. This is a good grass region, and raises a great number of cattle, horses, sheep, &c. The population in 1870 was 9,597. It contains 250,132 acres of land, assessed at \$640,461. The farm animals are, horses and mules, 3,395; cattle, 9,210; sheep, 4,297; swine, 9,350.

This county is self-sustaining in all the productions of the farm, garden and dairy. Improved lands sell at \$10 to \$15 per acre. Bees and poultry thrive well; no chicken cholera. Fruit raising is beginning to be an interesting and profitable business. The climate is pleasant and healthy, and the natural advantages of this section are very great. It lacks railroad facilities, the nearest road being the Atlantic, Mississippi and Ohio, passing through the adjoining county of Smyth.

This county has valuable mineral resources; copper, iron, mica, asbestos and steatite are found here.

GREENE COUNTY

Was formed in 1838 from the western part of Orange, and was named from General Nathaniel Greene, the Revolutionary hero. It lies on the eastern slope of the Blue Ridge, adjoining the counties of Albemarle, Madison, Rockingham and Page. The surface is rolling, and the soil rich and productive, being finely adapted to tobacco, the grains and grasses. Very fine stock and sheep are raised here. It is drained by the Rapidan river and the head waters of the Rivanna. Fine water-powers are found on the Rapidan and its tributaries. There is no railroad passing through the county; but the Chesapeake and Ohio railroad, at Gordonsville, is

within a short distance of its border, and the Virginia Midland and Great Southern railroad passes near its eastern boundary. These roads afford convenient access to market. Iron ores of great richness, and some fine copper ores (native copper malachite and azurite) are found in this county. Its healthfulness cannot be surpassed; and the scenery, diversified with hill, dale and mountain, covered with luxuriant crops and forests, is very beautiful. The population is 4,634; area, 107,584 acres, assessed at \$581,609; horses and mules, 1,360; cattle, 2,243; sheep, 1,474; swine, 4,212. Stock raising is extensively and profitably carried on; sheep being the most profitable. With cheap lands and a healthful and pleasant climate, Greene county offers good inducements to settlers from other parts of the country. It is fully self-sustaining in all the productions of the soil, and markets one-third of its staple products. Good farms with improvements can be bought for \$15, and unimproved lands \$1.50 to \$8 per acre. Stanardsville, the county seat, contains 500 inhabitants.

GREENSVILLE COUNTY

Was formed in 1780 from Brunswick. It is 24 miles long, by a variable breadth of from 8 to 24 miles. The surface is generally level; soil, light and sandy. It is drained by Nottoway river on its north line, and the Meherrin, which runs through the centre, and Fountain creek. The Meherrin furnishes shad and other fish to the inhabitants. Its productions are tobacco, corn, wheat, oats, cotton and peanuts. The population is 6,362. Number of acres of land, 190,305, assessed at \$636,003. Number of horses and mules, 957; cattle, 2,597; sheep, 787; swine, 4,811. Unimproved land sells at \$2 to \$5 per acre. Some portions of the county have stiff clay soil, which is productive. Sheep-raising is said to pay 50 to 100 per cent. on investment. Marl is found in various parts of this county; whether much used we are not informed. The Petersburg and Weldon railroad passes through this county, and the Seaboard and Roanoke railroad near its southern border.

Twenty-five families of immigrants have settled in this county since the war:—17 from the north, 1 from England, 4 from Scotland, 1 from Canada, and 2 from Ireland. There are 13 churches and 10 lumber and 2 wheat and corn mills. There are large quantities of white oak, ash and pine lumber. There is a tram railroad nine miles long (on which is used a steam engine), leading from the Petersburg and Weldon railroad to a body of as fine white oak lumber as can be found in Virginia or any other State. This is a healthy county.

HALIFAX COUNTY

formed in 1752 from Lunenburg. It is one of the largest and wealthiest counties in the State. It borders on the North Carolina line, with Pennsylvania on the west and Mecklenburg on the east. It lies in the heart of the finest tobacco-growing section of the State, and its production of tobacco, wheat, corn and oats aggregate a very large amount. This county is remarkably well watered, the Staunton river skirting its entire northern and northwestern boundaries, with numerous tributaries penetrating the county, while the Dan and Banister rivers penetrate the interior. The soil of these streams is of great fertility, producing large crops of grain year after year without rest or fertilizer. Much wealth and refinement existed here, though the wealthiest families lost very heavily by the late war, as they did in all parts of the State; but this county was very largely slave-holding. The population is 27,828. Acres of land, 516,908, assessed at \$105,166. Horses and mules, 4,265; cattle, 8,874; sheep, 3,193; swine, 17,375. The average price of land is \$5 per acre. The farm products are well adapted for the use of the inhabitants, except in the article of bacon, the raising of which has been caused mostly by hog cholera. One-fifth of the tobacco and all the tobacco crop is shipped, and one-half the meat supply is to be bought. While not strictly a grass country, all the grasses do well on good land. Sheep raising is largely carried on, with profits of from 25 per cent. to sixty-five per cent. on investment. The Richmond and Danville railroad traverses this county from northeast to southwest, by which route the county seat is 115 miles distant from Richmond. Plumbago is found in the county.

HANOVER COUNTY

formed in 1720 from New Kent. It is 45 miles long and 14 wide. The surface is generally level, and in many parts rich and productive. It is situated between the Pamunkey and Chickahominy rivers, and is well drained by their tributaries and the North Anna and South Anna rivers, Little Back and Newfound rivers, tributaries of the Pamunkey. The productions of this county are varied—corn, wheat, tobacco, oats, Irish potatoes, and early vegetables generally. The population is 3,455. Number of horses and mules, 2,802; cattle, 4,103; sheep, 1,400; swine, 7,468. The soil in the upper or western part is clay-loam; on Pamunkey river a rich loam, with clay sub-soil; and in the eastern part and on the Chickahominy, a light, friable, sandy loam. Its products are largely shipped, both to Richmond city and the northern markets. The farmers do not all make full supplies of bacon, but in other products make a large surplus. "Trucking," in the lower end, particularly in sweet potatoes

and melons, is said to be very profitable, and sheep-raising reports pay 100 to 200 per cent. The "green-sand marl" of the Pamunkey valuable fertilizer, and has been extensively used in former years great benefit to the soil. It has also other marls containing a good cent. of carbonate lime. The county is well watered in every part, and intersected by the Richmond and Fredericksburg railroad and Chesapeake and Ohio railroad.

Green sand and calcareous marls, mica and granite are found; and has been found near South Anna and Little rivers, of the character "splint," but how large the deposits are has not been ascertained.

COMPOSITION OF EOCENE MARLS IN HANOVER, BY PROF. ROGERS.

	Per
William H. Roane's lower stratum—Silica and alumina, &c.....	50
Carbonate lime.....	4
Green sand.....	46
Gypsum.....	3
Walker Tomlin's lower stratum—Silica and alumina.....	60
Carb. lime and gypsum.....	A tra
Green sand.....	40

HENRICO COUNTY

Was one of the original shires into which Virginia was divided in 1783. Its length is 27 miles; mean breadth, about 10 miles. The surface is undulating; soil on the rivers very productive. It is drained on the south by James river, and on the north by the Chickahominy, and their tributaries. It produces largely of corn, wheat, oats, and some tobacco. population in 1870 was 66,779. Number of acres of land, 125,573 assessed at \$4,047,858. Number of horses and mules, 2,660; cattle, 2, sheep, 723; swine, 2,632.

Having the large city of Richmond near the centre of its south border, the products of the farm have quick, ready sale, and small cost of carriage. Its productions are large and varied, and the profits of farming good as in any part of the country. Green sand marl has been found in the lower or eastern part of the county, and been used on the land with excellent results; also white marl, rich in lime, abounds in the lower part and has been very profitably used. Grass succeeds well on improved land. There are several large nurseries and many large orchards and vineyards in the county.

Granite in great abundance, potter's clay, and coal, exist in Henrico. "Natural" coke of excellent quality is largely mined in the upper part of the county.

MIOCENE MARLS—ANALYSIS FROM PROF. ROGERS.

	Per carb.
Henrico county—Mr. Organ's (upper plantation): Light, fine and friable, but slight traces of shells; a little green sand.....	47
Deep Bottom: Light yellow, indurated, containing casts of shells slightly micaceous.....	54

HENRY COUNTY

as formed from Pittsylvania in 1776. It is nearly a square of 18 miles a side. The surface is undulating and hilly; the soil productive. It is drained by Smith's river and Mary's river, and other branches of the same. Tobacco, corn, wheat, oats and grass are its principal productions. The population is 12,303. It contains 241,713 acres of land, assessed at \$7,662. Number of horses and mules, 2,191; cattle, 5,538; sheep, 9,078; swine, 9,074. It is a very good stock country.

The soil varies from sandy to clay loam. This county produces most of its supplies. Price of land, about \$5 per acre. It is situated in a healthy climate in southern Piedmont—one of the most favored sections of the State. It is, as yet, without good access to market. Tobacco is largely raised, and is noted for its fine quality. Iron ore, quartz, soapstone, and soapstone are found in Henry.

HIGHLAND COUNTY

as formed in 1847 from Pendleton and Bath. It is 30 miles long by about 25 broad. This is an elevated mountainous region, adapted chiefly to grazing and pasturing. The soil is mainly limestone, and produces good crops of corn, wheat, rye, buckwheat, and all the grasses. The number of acres of land is 240,166, assessed at \$1,013,789. It has 1,947 horses and mules; 7,612 cattle; 9,160 sheep; and 3,105 swine. Population, 15,451.

There is no limit to the meat-producing capacities of this county. All the lands produce grass as soon as the timber is taken off, without seed. There is no place where a living is more easily made, and where people enjoy more of ease and leisure. The health of this county is excellent. Valuable timber abounds, but not yet very accessible to markets. The Washington City and St. Louis Narrow-Gauge railroad, which is now being constructed by way of Bridgewater to Monterey, in Highland county, and through West Virginia, its ultimate point being St. Louis, will run through this county.

Iron ore and marble are found in this county. Coal exists to a considerable extent, but has not been mined.

ISLE OF WIGHT

is one of the eight original shires into which Virginia was divided in 1634. It is 37 miles long, with a mean width of 11 miles. Surface level, soil sandy. It is drained by numerous creeks. Its productions are corn, wheat, oats, cotton and peanuts. The population is 7,320. It has 187,079 acres of land, assessed at \$1,157,447. Number of horses and mules, 1,452; cattle, 3,652; sheep, 1,808; swine, 15,491.

There are large quantities of marl in this county, which, with lime, are much used in peanut culture. Large quantities of melons and vegetables are raised for the northern markets. It is self-sustaining in all but wheat. Good lands can be bought for \$10; unimproved, from \$2 to \$5 per acre. It is watered by the Blackwater river and numerous creeks, and is well supplied with fish and oysters. The Atlantic, Mississippi and Ohio railroad and Seaboard railroad pass through it.

The lands are very easily cultivated, and productive, and the access to market very easy and cheap. Timbers are abundant.

ANALYSIS OF MIOCENE MARLS.

From Professor Rogers.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
Mr. H. Day's.....	Perfect shells and fragments ; green sand, a trace.....	76.1
do.	Ferruginous rock marl ; green sand, a trace.....	77.2
Mr. Saunders'.....	{ Second stratum, yellow, fragments of shell ; considerable } green sand.....	48.8
do.	Third stratum, do. do.	60.2
do.	do. do. do.	42.0
James Pedin's.....	Light, shells entirely decomposed ; green sand, a trace.....	54.5
Day's Point.....	Blue, friable.....	7.9
G. Purdie's.....	Shells and fragments ; green sand, a trace.....	71.5
do.	do. do. do.	62.5
do.	Conglomerate, do. do.	81.8
do.	do. do. do.	63.6
Mr. White's.....	{ A conglomerate of perfect shells and fragments ; ferru- } ginous.....	91.3
Mr. S. P. Jordan's.....	{ Comminuted fragments of shell in a ferruginous sand ; } green sand, a trace.....	53.4
do.	{ Comminuted fragments of shell in a ferruginous sand ; } green sand, a trace.....	79.5
Merit Todd's.....	Light, shells decomposed ; green sand, a trace.....	28.4
do.	do. do.	42.0
Rocks.....	Blue, very friable.....	7.95
do.	A coarse, shelly conglomerate ; yellow.....	78.4
Mr. Booth's.....	Of a very light yellow color, containing small fragments....	64.7
do.	Shells decomposed.....	71.5
John Y. Mason's.....	{ A yellow sand, with shells and fragments ; green sand, a } trace.....	35.2
Burwell's Bay	Blue marl, with a little green sand.....	62.0
do.	Yellow marl, with peroxide iron.....	55.2
Joel Holleman	White, with small shells, and some green sand.....	80.2

JAMES CITY COUNTY

Was one of the original shires. Its length is twenty-six miles, and its mean breadth eight miles. It lies in the peninsula formed by the York, the James and Chickahominy rivers. The surface is level, or gently undulating. The soil on the rivers is rich and productive; the ridge lands are generally light, but easily improved.

The population is 4,435. It has 89,120 acres of land, assessed at \$390,-928. Number of horses and mules, 540; cattle, 1,900; sheep, 724; swine, 2,361. This county is self-sustaining, except in meat. Fish and oysters abound, and are of course important sources of food. Land sells for \$10 to \$25, for improved; \$1 to \$10 for unimproved, per acre.

Marl is abundant, and was used before the war with fine effect on the soil. The ancient and renowned town of Williamsburg, the seat of William and Mary College, which has sent out many distinguished men from its halls, is in this county.

Corn, wheat and oats are the principal crops. The lands are easily cultivated and produce well for the labor bestowed; fruits and all vegetables do well.

ANALYSIS.

Miocene Marl in James City.

FROM WHOM.	REMARKS.	PER CENT. CARB. LIME.	RESIDUARY MATTER.
The Grove—Burwell's...	Reddish gray with frag- ments of shells and nume- rous specks of green sand }	60.2	{ Sand, clay and a large proportion of green sand.
Do. from a lower stratum.....	Similar appearance—specks more numerous.....	54.7	{ Do. do. still more green sand.
King's Mill Cliff.....	Similar aspect.....	62.0	Do. do. much green sand.
Judge Semple's farm, two miles below Wil- liamsburg	Similar aspect.....	79.0	Do. do. do.
Dickie Galt's, near the Williamsb'g Hospital }	Pulverulent and white.....	79.0	
Dr. Semple, thirteen miles from Williams- burg.....	Yellowish pulverulent.....	84.3	Sand and clay.
Do. another stratum.....	Grayish yellow.....	54.5	{ Do. do. and some green sand.
Dr. Peachy's, near Jamestown	White pulverulent.....	72.0	Chiefly clay.
Mr. Winn's, near York....	do. do.	72.7	{ Clay and a little green sand.
Mr. Wade's.....	do. do.	69.1	Do. do.
King's Mill.....	Chiefly fragments of shells with green sand	56.8	

KING GEORGE COUNTY

Was formed in 1720 from Richmond. It is eighteen miles long, with a width of ten. Its surface is rolling, and its soil diversified. It lies between the Potomac and Rappahannock. The population is 5,742. It has 112,737 acres of land, assessed at \$977,446. Number of horses and mules, 1,414; cattle, 3,156; sheep, 2,015; swine, 4,450.

The productions of this county are ample for the support of its inhabitants, except in meat, and it furnishes large amounts of products for market. Good lands sell for \$4 to \$30 per acre. They have admirable facilities for reaching market, afforded by two large rivers, navigable for large steamers. There is marl in this county of various kinds, but there has been very little used since the war. The people are well supplied with fish from the Potomac and Rappahannock, and with oysters. Fruits of all kinds do well in this county.

King George Courthouse is a village of 300 to 400 inhabitants. Port Conway, on the Rappahannock, has about 250 inhabitants. This is one of the famed Northern Neck counties (Westmoreland, Richmond, Northumberland and Lancaster being the others). The lands are good, particularly those on the rivers, which are very productive and easily cultivated, and altogether it is a very desirable part of the State to live in.

Miocene Marl.

Carb. Lime.

King George—Mill on Machadox run. Blue—a little green sand..... 17.0

KING & QUEEN COUNTY

Was formed from New Kent in 1691. It is forty miles long and eleven miles wide. The surface is rolling and the soil sandy, with clay subsoil. It is drained by Pianketank and Mattaponi rivers and Dragon swamp. The productions are corn, wheat and oats. It has immense beds of marl, which furnish large supplies for the improvement of the soil, and the marl has been much and profitably used. The population is 9,700. It has 189,830 acres of land, assessed at \$835,654. Number of horses and mules, 1,244; cattle, 4,824; sheep, 2,720; swine, 5,102.

There are 100,000 acres in timber, the principal kinds of which are pine, oak, chestnut, beach, poplar and ash; 60,000 acres in cultivation—in wheat, 10,000; average yield, 7 bushels. In tobacco, 1,000; yield, 600 pounds. Oats, 20,000; yield, for winter-sowed, 10 bushels;* for spring oats, 6 bushels.* Irish potatoes, 1,000; yield, 50 bushels. Sweet potatoes, 1,000; yield, 25 bushels.* Corn, 12,000; yield, 20 bushels. Clover, 20,000.

* There must be some mistake, from some cause, in these figures.

Orchard grass, 1,000; yield, 1 ton. In orchards, 1,000. Apples, peaches, pears, cherries, &c. There are 30 public and 11 private schools in good condition. There are 14 churches in the county, of which 8 are Baptists, 5 Methodists and 1 Reform. There have been 25 immigrants to the county from Northern States in the last five years. Good lands can be bought at from \$4 to \$10 per acre. The inhabitants are well supplied with fish and oysters.

MIOCENE MARLS IN THIS COUNTY.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
Mr. Motley's.....	Blue, small shells and fragments; green sand, a trace.....	14.7
Mr. Pollard's.....	Blue, fragments of shell; green sand, a trace.....	21.5
Mr. Gresham's.....	Light, fragments and decomposed shell.....	82.9
Mr. Duval's.....	Bluish, small fragments of shell; green sand, a trace.....	73.7
Piedmont.....	Blue, containing fragments of shell; green sand, a trace...	30.6
do.	Lower bank, blue; do. do.	22.2
Mr. Bagby's.....	White, shells finely decomposed.....	80.6
do.	Blue, containing fragments of shell.....	30.6
Mr. Mann's.....	Light, nodular.....	78.4
do.	White, containing small fragments of shell.....	80.6
Mr. Burton's.....	Light, shells decomposed.....	85.2
Mr. Atkins'.....	Small fragments of shell.....	76.1
Mr. Ryland's.....	Shells decomposed.....	46.5

KING WILLIAM COUNTY

Was formed in 1701 from King & Queen. It is 32 miles long by 8½ miles wide. The surface is generally level. The soil varies from stiff clay to sandy loam, and is very fertile on the streams. It lies between the Pamunkey and the Mattaponi, which unite at its southeast corner and form the York. These streams afford fine fisheries, and are navigable for a considerable distance above their junction with the York. West Point, the place of their junction, is the terminus of the Richmond, Chesapeake and York River railroad, and a shipping point of great importance. York river is navigable to that point for large steamers.

The population is 7,515. Number of acres of land, 166,897, assessed at \$1,000,352. Horses and mules, 1,388; cattle, 2,496; sheep, 1,989; swine, 3,608.

The productions are corn, wheat, oats, potatoes and fruits. Improved land sells for \$5 to \$10 per acre, unimproved from \$1 to \$3.

The products of the county are largely in excess of consumption of the inhabitants, except in meat. There is abundance of excellent marl, which has been used with much benefit to the soil. The green-sand marl of King William is nearly identical with that of New Jersey, which is so valuable as to form an article of export. This county is a very inviting field for the new settler, with its cheap lands, easy to enrich, its fisheries, and accessibility to market, and its great deposits of valuable marl. When we say this of King William, however, it is applicable to many other counties of Tidewater.

MIocene MARL.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
Robert Hill's.....	Light, shells decomposed.....	54.5
do.	Light, shells decomposed.....	68.4
do.	Large fragments of shell in blue sand ; green sand, a trace..	12.5
Mr. Edwards'.....	Light, decomposed shells and fragments.....	76.1
Mr. Ellet's	Blue, containing fragments of shell.....	7.9
do.	Light, tenaceous, containing perfect shells and fragments..	26.3
Scotland Banks.....	Blue, containing fragments of shell.....	7.9
Mr. Neal's..... {	Fragments of shell intermixed with sand ; green sand, a } trace..... }	21.5
do. {	Fragments of shell intermixed with sand ; green sand, a } trace..... }	14.0

GREEN SAND (EOCENE) MARL.

Dr. Corbin Braxton—Silica and alumina, &c.....	50 per cent.
Carbonate of lime.....	10 “
Green sand.....	38 “
Gypsum.....	2 “

LANCASTER COUNTY

Was formed in 1651. It lies on the north bank of the Rappahannock river, and a portion of the eastern boundary lies on Chesapeake bay, with Northumberland and Richmond counties on the north. The court-house lies in the northern part of the county, eighty-three miles northeast of Richmond. The surface is mostly level, with some rolling lands. The soil is a sandy and clay loam, and produces good crops of corn, wheat, oats, vegetables and fruits. It is drained by numerous creeks running from the interior of the county, of which the following are tributaries of the Rappahannock river : Moratico, Deep, Mud, White House, Carter's and Mosquito

creeks, and Corrotoma river, with its eastern and western branches. The following are tributaries of Chesapeake bay: Antipison, Tabb's, Dymor's and Indian creeks, and Little bay. There are two steamers plying between Baltimore and Fredericksburg, which touch at various landings in this county four times a week; and one steamer between Baltimore and Piankatank, touching at a wharf on Dymor's creek. Some ship and spoke timber, and a large quantity of cord-wood, is shipped from this county; and immense quantities of oysters are shipped annually. The products are corn, wheat, oats, vegetables and fruits. The population is 5,355. Number of horses and mules, 754; cattle, 2,562; sheep, 926; swine, 3,619. There are 22 schools, of which 17 are public; 15 churches, of which 5 are Methodist, 7 Baptist, and 3 Episcopalian. About 200 immigrants have settled in the county in the last five years. The average price of land is about \$10 per acre. It has 14 factories. A large area (2,000 acres, consisting of apples, peaches, pears, apricots, plums, &c.,) of this county is in orchards. Corn is the chief farm crop, but some of the lands produce large crops of wheat. With quick and cheap transportation to the markets north, this county is enabled to throw her early products on the market at the most propitious time, and from ten to fifteen days ahead of most other parts of the State. The health of the county is good. Consumption is rarely heard of.

PER CENT. OF CARBONATE LIME IN MIOCENE MARLS IN LANCASTER COUNTY.

FROM WHOM OBTAINED.	GENERAL CHARACTER.	PER CENT.
Curratomen:		
J. Cabell..... } Five beds..... }	Grayish yellow, silicious clay filled with hollow casts; } average of the five beds..... }	50.19
Mr. Blernup's, five } miles below C. H... }	White pulverulent.....	93.6
Mr. Robert Christian,	do. do.	76.1
Mr. J. Marshall.....	do. do.	85.0
Capt. J. Robinson's... }	Small fragments of shell in a feruginous sand; green } sand, a trace..... }	42.00
do.	do. do. do.	37.50
Mr. Yerley's.....	do. do. do. (rather compact).....	30.6
do.	Yellow, aluminous; green sand, a trace.....	12.2
do.	do., consisting of shelly fragments; green sand, a trace,	21.0
Mr. Cabell's.....	Shells decomposed and partially cemented.....	42.0
do.	do. do. do.	46.5
Mr. Callahan's..... }	Yellow, fragments of shell in ferruginous sand; large } grains of green sand in considerable quantity..... }	21.5
Mrs. Palmer's	Yellow, small shells and fragments; green sand, a trace.....	32.9
Benjamin Walker's...	Blue; green sand, a trace.....	18.0
Warner George's.....	Blue, shelly fragments; green sand, a trace.....	14.7

Per Cent. of Carbonate Lime, &c.—Continued.

FROM WHOM OBTAINED.	GENERAL CHARACTER.	PER CENT.
Colonel Palmer's..... }	Light, conglomerated fragments of shell ; green sand, a } trace..... }	57.0
do.	Shells decomposed and partially cemented.....	37.5
Dr. Jones'.....	do., porous.....	86.8
Union Mills.....	Yellow, small shells in ferruginous sand.....	23.8
do.	Light, quite compact, shells small ; green sand, a trace.....	62.5
Col. Phil. Brannan's...	Blue, tenacious, small shells ; green sand, a trace.....	21.5
Mr. S. Downing's.....	Bluish ; 10 to 12 per cent. of green sand.....	17.0
Braxton Tomlin's	Light, shelly fragments ; green sand, a trace.....	32.9
S. Downing's (No. 4), }	White, compact, with impressions of shells, specked with } green sand..... }	67.4
Williamson Tomlin's.	Blue, with small shells : green sand, a trace.	

LEE COUNTY

Was formed from Russell in 1792. It lies in the southwest corner of the State bordering on Tennessee and Kentucky. Its greatest length is 6 miles ; mean breadth 10 miles. Three-fifths of the surface is mountainous or hilly, but the mountains on the north side are rich to the top, and probably three-fifths of the soil of the entire county is very fertile. The timber consists of the oaks (an immense quantity of white oak), poplars, maples, buckeye, birch, beech, ash, cucumber, spice-wood, mulberry, locust, hickory, chestnut, much black walnut, with vast forests of red cedar near Powell's river of the best quality for the manufacture of cedar ware. The productions are corn, wheat, buckwheat, oats, rye and tobacco. The cultivation of tobacco is on the increase. A great variety of vegetables and fruits is produced. Population about 15,000. The county is rich in minerals. Poor Valley ridge, which runs parallel to Cumberland mountains through the whole length of the county, has a rich vein of iron ore (dyscrasite—red hematite) extending throughout the entire length. The Cumberland mountains contain inexhaustible supplies of the best bituminous coal, a part of which is in this county. It is well watered by Powell's river and other streams. There are strong indications of zinc, lead, and other valuable minerals. Salt has been made at two points in this county but there are no works now in operation.

It has 365,240 acres of land, assessed at \$1,188,265. Number of horses and mules, 4,160 ; cattle, 10,000 ; sheep, 11,000 ; and about 20,000 swine. About one-half of the area of the county is cleared land, one-tenth of which is in wheat, yielding from six to ten bushels per acre, the remainder

oats, rye, corn, tobacco and grass. It is a fine grass county, and is famous for fine cattle, horses, &c. It has at least 2,500 acres in orchards of every variety of fruit. There are 70 public schools and 5 high schools; 7 churches, principally Baptist and Methodist. There are about 1,500 hives of bees, valued at \$7,500.

LOUDOUN COUNTY

Was formed in 1757 from Fairfax. The Potomac river bounds it on the north, and the Blue Ridge mountains on the west, with Fauquier and Prince William counties on the south, and Fairfax on the east. It is about 28 miles long and 22 broad. The surface is varied with mountains, hills and broad valleys. The soil is also varied from fertile loam to unproductive hills and mountains. The larger proportion is very fertile, and produces large crops of wheat, corn, oats and hay, and some tobacco, which is yearly increasing in production. Horses, cattle and sheep are raised in large numbers and of superior quality. It is a county highly favored by nature, and its inhabitants are industrious and thrifty, and are diligent in improving their advantages. It contains many improved farms and skilful farmers. The productions are ample for its support, with a large surplus of grain, meat and hay for market. Its produce finds a ready and convenient market in the cities of Washington and Alexandria, with which places it is connected by the Washington and Ohio railroad, which traverses the county from east to west. It contains 322,395 acres, valued at \$9,865,799, or \$30.60 per acre. The population is 20,929. Number of horses and mules, 8,230; cattle, 20,081; sheep, 30,882; swine, 15,747. It is evenly drained, and has many fine water-powers, of which seventy-seven are in use as mills. There are thirty-seven churches of the various denominations. There are a large number of public schools in good condition, a handsome academy at Leesburg, and several good boarding schools. The minerals are marble, copper ores, soapstone and asbestos. Hydraulic limestone is found at Colonel Taylor's in this county, containing about 56 per cent. carbonate lime, 25 per cent. silica, and $2\frac{1}{3}$ per cent. alumina and iron. Another specimen from Mr. McIlhaney's contains 44 per cent. carbonate lime, and 25 per cent. carbonate magnesia, about 1 per cent. of silica, and 1 per cent. of alumina and iron. These are highly hydraulic. The following is an analysis of hydraulic limestone from near Shepherdstown, in Berkeley, West Virginia, made by Professor Boynton (leaving out decimals):

Carbonate lime.....	58.00
Carbonate magnesia.....	11.00
Silica, clay, and the soluble silica.....	17.00
Alumina.....	4.00

with a moderate amount of chloride of sodium and potassium and iron. This analysis differs from three others, by the same chemist, of the New York hydraulic limes, in containing more carbonate lime, less of silica and clay, less of alumina than in two of these specimens, and less of carbonate magnesia. The making hydraulic cement seems to depend on the union of caustic lime with alumina and silica. The carbonate magnesia has some important influence, and the proper proportion of carbonate lime is necessary, for if there is too much lime the limestone ceases to be hydraulic.

LOUISA COUNTY

Was formed from Hanover in 1742. It is about 30 miles long and 18 miles wide. The surface is gently undulating, and the soil on the rivers and their numerous tributaries is very good. It is watered by the North Anna and South Anna rivers and their numerous branches.

The population is 16,332. Number of acres of land, 316,197, assessed at \$2,229,957. Number of horses and mules, 2,659; cattle, 7,346; sheep, 8,559; swine, 10,841. Good lands can be bought for \$10 per acre; unimproved land from \$2 to \$5 per acre. Lime and gypsum act well on most of the soils. The productions are tobacco, corn, wheat and oats. The county is self-sustaining. The Chesapeake and Ohio railroad passes through the centre of the county.

Near Tolersville, in this county, are copper, iron, gold, silver and lead. There were, in 1860, 57 manufacturing establishments in this county, with \$218,800 of capital invested, producing annual values of \$455,950. There is a remarkably productive district of land in the northwest part of this county—the "Green Springs"—producing fine crops of wheat and corn and tobacco. The minerals of this county are very valuable, and properly worked would be a source of a large revenue. Iron has been very profitably mined by Mr. Jordan. A description of these mines will be found in another part of this report.

The lands generally are good and are improving yearly. The county is very healthy, and it is a very desirable section of country, possessing many advantages for persons seeking new homes.

LUNENBURG COUNTY

Was formed in 1746 from Brunswick. It is 25 miles long and 16 miles wide. The surface is flat or gently rolling; soil grayish slate, tolerably productive and easily worked. It is watered by Meherrin and Nottoway rivers and their tributaries.

The population is 10,403. It has 269,090 acres of land, assessed at \$955,907. Number of horses and mules, 1,505; cattle, 5,019; sheep, 3,370; swine, 6,631. Land sells at from \$2 to \$5 dollars per acre. The productions are tobacco, corn, wheat and oats. This county produces enough of breadstuff and forage, but not enough meat for home consumption. Clover, orchard-grass and red-top grow well on improved lands. Gypsum and commercial fertilizers are used with much benefit on these soils. It is one of the healthiest counties in the state, and is self-sustaining. The Richmond and Danville railroad runs on the northwest portion of the county.

This county abounds in good timber, especially white oak, pine and hickory, and any quantity of red oak, Spanish oak, Turkey oak, and some walnut and maple. Recently there has been discovered in the northern part a mineral spring thought to be very valuable, and among the best of the Lithia waters. It is said to have made some wonderful cures, but as it belongs to a very poor widow it has not become very generally known. The county is very healthy, and the society excellent. It offers good inducements to immigrants.

MADISON COUNTY.

Was formed in 1792 from Culpeper. It is 33 miles long and 23 wide. The surface is hilly and mountainous. The soil dark, rich, red land, and produces tobacco of fine quality. It is watered by the Rapid Ann and Robinson rivers and their tributaries. The population is 8,670. It has 211,906 acres of land, assessed at \$1,720,226. Number of horses and mules, 2,627; cattle, 6,765; sheep, 4,612; swine, 8,738. The products of this county are more than enough for the support of its inhabitants. Large amounts of leading productions are sent to market. Price of land from \$3 to \$50 per acre. The productions are tobacco, corn, wheat, oats, rye, grass and meat. This is a good grass county, and with a dog law, would be a large wool and sheep-growing county. The bottom lands on the Rapid Ann and Robinson are remarkably fertile. Extraordinary corn crops have been raised on them for forty consecutive years, without any apparent diminution of fertility. These rivers, and the streams flowing into them, furnish fine water-power, which is utilized chiefly for corn, wheat and lumber mills. There is also one woolen factory in operation on Robinson river, about four miles east of the courthouse.

The Virginia Midland railroad passes near the eastern border of the county, and the Chesapeake and Ohio railroad near its southern line.

Magnetic iron ore of great purity, and copper and lead ores, are met with in this county.

This county has many valuable timbers in great abundance, as walnut, hickory, the oaks, pine, &c. It is remarkably healthy, and the society refined and agreeable.

MATHEWS COUNTY

Was created in 1790 from Gloucester. It is 20 miles long, and its widest section not 9 miles. It is a peninsula, extending into Chesapeake bay, united to the main land by a narrow neck of land scarcely a mile wide, and its boundaries are almost entirely of water. Its surface is a dead level. The soil is light and sandy, but some is quite fertile. Mathews is famous for fish and oysters, which are a source of profit to the population.

The population is 6,200. It contains 53,802 acres of land, assessed \$640,761. It has 155 horses and mules, 759 cattle, 283 sheep, and 4,200 swine. The farm products are corn, wheat and oats, of which ample supplies are raised for support of the inhabitants.

The timber is pine and oak. Lands sell at \$5 to \$12 per acre. Cultivated in wheat, 300 acres; yield, 10 bushels per acre. In oats, 1,000 acres; yield, 12 to 15 bushels. In potatoes, 300; yield, 100 bushels. In grain, 200 acres; yield, from 1 to 2 tons. In orchards, 300 acres—in apples, peaches and pears. There are 24 public schools and 2 private schools in good condition. There are 14 churches, of which 6 are Methodist, 5 Baptist, 2 Episcopal and 1 Disciples. There are 2 vineyards, containing 100 acres, from which 150 gallons of wine are yearly made. Our correspondent says the health of Mathews is excellent; fish and oysters abound.

MIOCENE MARL.

	Per cent Carb. Dioxide
A. Braxton's: Shells conglomerated, occasionally crystallized, light.....	48.8
Warehouse Creek: Compact and semi-crystalline; ferruginous.....	87.5

MECKLENBURG COUNTY

Was formed in 1764 from Lunenburg. Its length is 36 miles, mean width 18 miles. The surface is rolling and the soil fertile. It is watered by the Roanoke and Meherrin and their branches.

The population is 21,318. It contains 417,651 acres of land, assessed at \$2,081,341. The number of horses and mules is 3,373; cattle, 8,850; sheep, 3,731; swine, 13,340. The productions are tobacco, corn, wheat and oats. Sheep-raising would be profitable but for the dogs. Bee culture

ure is reported to pay well. Land sells for from \$4 to \$12 per acre. About one-half of the surface is in timber, consisting of all the oaks, poplar, ash, hickory, beech, birch, maple, pine, gum, dogwood, &c.

The average yield per acre of the main crops is: Wheat, 10 bushels; tobacco, 500 pounds; oats, 20 bushels; potatoes, 150 bushels; hay, $1\frac{1}{2}$ tons. There are 8,000 acres in orchards, of apples, peaches, pears, cherries, plums, quinces, apricots, &c. Two newspapers are published in this county. They have 60 schools, 55 public and 5 private, in a flourishing condition; 50 churches; 2 banks—the Bank of Clarksville, with \$11,000 capital, and the Bank of Mecklenburg, with \$20,000 capital. It is estimated that 500 immigrants have settled in the county within the last five years. There are three vineyards, containing 10 acres of land, in the county. The health of the county is excellent, and the society very good. “Chase City,” founded by English immigrants, is in this county, and the people are anxious to secure more of such a good class of immigrants.

The “Buffalo Lithia Springs” are in this county. They have attained considerable celebrity in the treatment of various diseases, particularly in dyspepsia, gout, rheumatism and diseases of the kidney and bladder, and are believed to be equal to the best English waters of this class.

MIDDLESEX COUNTY

Was formed from Lancaster in 1675. It is 30 miles in length, mean width about 5 miles. This is a narrow strip of land lying between the Rappahannock and Piankatank rivers. The surface is mostly level; soil varies from sandy to stiff clay, very productive in corn, wheat, oats, and fruits of all kinds.

The population is 4,981. It contains 83,077 acres of land, assessed at \$599,372. Number of horses and mules, 707; cattle, 2,695; sheep, 1,497; and swine, 3,365. Improved land sells from \$5 to \$15; unimproved, \$1 to \$6.

Middlesex contains valuable marl, rich in lime, and has been considerably used, and advantageously. Clover grows well in the interior of the county. The county is self-sustaining. Fish and oysters abound, and fruits and trucks are raised to some extent. Pea and clover fallows are used, and the lands are improving. Society is very good, and it is a favorable county for immigrants.

MIOCENE MARL.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARBON. LIME.
Dr. Rowan's.....	No. 1—Light, containing small fragments of shells.....	39.7
do.	No. 2—Consisting of small shells; green sand, a trace.	48.8
Prospect Hill Creek } Shore.....	Composed of small shells, intermixed with sand; } green sand, a trace	38.5
D. Oaks'.....	White, in small nodules; green sand, a trace (five } specimens).....	Average 74.26
Captain Halley's.....	Light, containing fragments of shell; a little green } sand.....	26.1
C. Braxton's.....	White, shells decomposed; green sand, a trace.. ..	64.7
do.	Shells less decomposed, and slightly cemented.....	67.0
do.	do. do.	87.0
Colonel Blakey's.....	White, decomposed shells, and fragments cemented..	82.9
Mr. Jesse, near Urbana..	No. 1—White pulverulent.....	93.3*
do. do.	No. 2—Sandy and greenish blue.....	33.0*
Dr. R. Christian, near } Urbana.....	Chalky; small fragments of shell.....	59.5*
Mrs. Thurston, eight } miles from Urbana..	White and pulverulent.....	95.4*

* Much green sand; sand and clay.

MONTGOMERY COUNTY

Is joined by Giles, Craig, Roanoke, Floyd and Pulaski. It is 23 miles long and 22 miles wide. The surface is broken and mountainous, and the soil very productive. It is drained by New river and the head waters of the Roanoke. The productions are corn, wheat, oats, tobacco and the grasses. The population is 12,556. It contains 606,520 acres of land, assessed at \$2,819,833. Number of horses and mules, 2,798; cattle, 6,710; sheep, 4,789; swine, 9,433. Land sells at from \$5 to \$100 per acre. This county is self-sustaining, and has a surplus of 25 per cent. of its productions. It is a fine grass and stock country, is well watered, and is located in one of the most favored sections of the State. The Atlantic, Mississippi and Ohio railroad passes through it.

Christiansburg, the county seat, is in the southern portion of the county, on the line of the railroad, and has about 1,200 inhabitants. There are several other thriving villages in this county, among them Blacksburg, at which place is located the Virginia Agricultural and Mechanical College. This institution was opened in October, 1872, has fine instructors, and is

endowed in part by a donation of public lands from the general government. There are several fine mineral springs in the county, among which are the following: Montgomery White Sulphur, the Alleghany and Yellow Sulphur, near the Atlantic, Mississippi and Ohio railroad. The county abounds in minerals, such as lead, iron, zinc, coal, limestone and marble.

Analysis of galena and zinc, ore, by A. A. Hayes, M. D., State Assayer of Massachusetts, from the property of Mr. George W. Anderson, of Montgomery county Virginia. 100 parts consist of—

Metallic lead.....	32.78
Metallic zinc.....	24.88
Lime as carbonate.....	2.24
Peroxide of iron as ochre.....	1.30
Silica and quartz.....	1.10
Carbonic acid, oxygen and sulphur.....	37.70

Between Blacksburg and Christiansburg, limestone is found, containing about 56 per cent. carbonate lime, 35 per cent. carbonate magnesia, and 6.50 per cent. silica, inferred to be hydraulic.

The semi-bituminous coal from Thomas creek and Strouble's run, in this county, consists of carbon 80.20; bitumen, &c., 13.60; and ash, 6.20. The combustible or calorific power of this coal is equivalent to 92.5 per cent. of carbon.

NANSEMOND COUNTY

Lies on the western border of the Dismal swamp, and extends southerly from Hampton roads to the North Carolina line. It is 30 miles long and 19 miles wide. The surface is level and the soil mostly sandy. It is drained by Nansemond river and Blackwater and their branches.

The population is 11,576. Number of acres of land, 256,242, assessed at \$1,514,767. Number of horses and mules, 1,880; cattle, 4,002; sheep, 1,264; swine, 10,070.

The productions are corn, wheat, oats, ground-peas, potatoes, cotton and early vegetables for the northern markets. "Trucking" has been a leading and very profitable business—nearly half of the county being devoted to this purpose. After the "truck crops" are removed, the farmers are beginning to utilize the land for subsistence supplies, such as orchard grass and pea vines hay (including the vines of the marrow-fat pea).

Commercial fertilizers are much used, and also composts. Lime and marl, in which the county abounds, are extensively applied. Stable manure is composted by the truckers with muck, rich earth, woods mould, &c., and the following receipt for compost we give as indicative of what is frequently used by truckers in lower Virginia, received from our well-informed correspondent in Nansemond:

GRANGE MIXTURE.

1. Dry peat, 20 bushels (or one ton); 2. Unleached ashes, 3 bushels; 3. Fine bone-dust, 3 bushels; 4. Ground plaster, 3 bushels; 5. Nit. soda, 40 pounds; 6. Sulph. ammonia, 40 pounds; 7. Sulph. soda, 40 pounds.

Mix ashes and bone-dust together, and after a few days moisten and add to the peat, *mixing well*. Next dissolve Nos. 5, 6 and 7 in ten gallons of water and sprinkle on the mass, turning thoroughly. Last, add the plaster, turn well, and it is ready for use in drills or hills; this quantity on 4 acres, 500 pounds per acre; cost, about \$10 for chemicals, per acre; has acted well on all crops tried, and might be broadcasted.

Early fruits have proved profitable for market, and the business has been extensively conducted. Winter apples and pears have not proved profitable. County self-sustaining; fish and oysters abundant. The Seaboard and Roanoke railroad runs through it, intersecting with the Atlantic, Mississippi and Ohio railroad.

We have the following from one of our correspondents, necessarily abridged: "Nearly every farmer within five or six miles of the river or either railroad, grows some truck as a money crop. Corn, oats, peanuts and cotton may be stated as the principal crops. The truck crops are melons, early Irish potatoes and sweet potatoes, often associated with peanuts and cotton on the borders of the trucking section proper—trucking belt extending from Norfolk county over twenty miles on each bank of the Nansemond. Market gardening is carried on to very great extent. Of late years these truckers pay much attention to the production of their supplies. After tomatoes and early Irish potatoes the land is prepared by simply plowing and harrowing for the native crab-grass, yielding an abundance of hay in September of fine quality. The vines of the marrow-fat pea also yield excellent hay, a little difficult to cure, but much relished by horses and cattle, and considered as nourishing as clover or timothy.

"The general character of the soil is sandy loam, mostly of gray color, dark or black land near the swamps. Near the rivers and creeks, some good clayey soils and wheat and grass lands are to be met with. As we remove from the river and creek shores, where the lands are undulating we approach level, *light* sandy lands, light in both color and texture. The price of land varies with *location* and quality; some trucking lands are held at \$50 per acre. From \$10 to \$20 for improved lands may be stated as an average; unimproved land, \$2 to \$5; good timbered land getting scarce.

"From my farm 330 bushels Irish potatoes have been sold to date (100 July), (from 15 bushels of seed planted) in New York and Boston markets at an average price of \$1 per bushel. I make large fruits a specialty. O

ermelons, there are 15 acres grown the present year for shipment; 19 acres in grass of different kinds, and 5 acres in trucks. The crop ripens about ten days before that of the Southside counties generally. The county not only grows its provision supplies of every kind, for man and stock, but sells a surplus sufficient to buy groceries, and is, therefore, *self-sustaining*. A very large proportion of the farmers work small farms, with one or three horses, and mostly do their own work. Clover and grass growing in this county is confined to a few, and is increasing to a limited extent. I do not consider the lands in general well adapted to wheat or corn culture, but on improved land and good clay subsoil, we find clover and all the grasses yield well. I am increasing my acres in grass annually."

MIOCENE MARLS IN NASEMOND.

Observations.

LOCALITIES.	GENERAL CHARACTER.	PER CENT CARB. LIME.
N Point.....	Ferruginous, with small shells and fragments.....	67.5
miles above } N Point..... }	Ferruginous, with small shells and fragments.....	52.3
Keeling's..... }	Small shells and fragments, in light sand; sometimes } conglomerated..... }	75.0
do.	More ferruginous, containing fewer shells.....	30.6
W Dumpling } and..... }	A conglomerate of fragments, quite compact.....	85.2
do.	Finely comminuted shells deeply tinged with iron.....	71.5
Cowper's.....	Ferruginous, consisting chiefly of fine fragments.....	72.7
Suffolk.....	Ferruginous, consisting chiefly of fine fragments; } green sand, a trace..... }	17.0
er Shore of Nan- } mond river (near } mouth)..... }	Small fragments of shells, with perfect shells inter- } mixed, ferruginous..... }	82.9
t above Sleepy } le Ferry..... }	Principally shells, intermixed with yellow sand.....	43.2
Suffolk.....	Blue, containing fine shelly matter.....	22.7
er Shore near } epy Hole Ferry... }	Blue, containing fine and coarse fragments of small } shells..... }	30.6
nel Corbell's.....	Small fragments of shell; ferruginous.....	62.5
do.	do.	76.2
or Crocker's.....	do.	64.7
do.	do.	28.0
L. Goodwin's.....	do.	53.4
Phillips'.....	do.	80.6
Chucatauck Mill...	do.	82.1

NELSON COUNTY

Was formed in 1807 from Amherst. It is 26 miles long and 20 miles broad. The surface is broken, and, near its western border mountainous. The soil is very rich and productive. James river forms its southeastern border. It is watered by Tye, Piney and Rock Fish rivers, and several smaller tributaries of the James.

The population is 13,898. Number of acres of land, 301,694, assessed at \$2,057,714. Number of horses and mules, 2,938; cattle, 5,960; sheep, 2,508; swine, 11,034. The productions of the county are more than enough for the support of its inhabitants, and consist principally of tobacco, corn, wheat, oats, grass, cattle, sheep and horses. Land sells for \$5 and \$10 per acre, and some of the best at \$40 or more. The soil is generally a "chocolate," easily improved and admirably adapted to growing grass.

This (Piedmont) section of Virginia is very healthy. The James river and Kanawha canal passing on the southern line of the county, and the Virginia Midland and Great Southern railroad having 22 miles of railway traversing it in a southwestern direction, afford ample outlet for the productions of the county. Gypsum has an excellent effect upon the lands, and is much used.

The valuable timbers are oak, pine, hickory, walnut, chestnut, cypress, beech, birch, dogwood, &c. Iron ore of fine quality is found in several parts of the county. There are also veins of gold, manganese, copper, lead, which promise to be valuable, and it is altogether a very fine section of the state, and offers excellent inducements to immigrants.

It is a fine fruit country, particularly for apples and grapes. Of these last there is no better region in the State, and probably in the world. Limestone exists in the county. A specimen from Elk creek, used as a flux at the furnace, contains about 83 per cent. of carbonate of lime (leaving out decimals) and but little magnesia. A specimen from the Greenway between Elk creek and Greenway contains of carbonate lime 64 per cent., of carbonate magnesia 30 per cent., alumina and oxide of iron 1.60, 2.50 per cent., and another from New Market, contains of carbonate lime about 57 per cent. and 43 per cent. carbonate magnesia. Near the mouth of Tye river and on the Rock Fish a true marble is found of a beautiful whiteness and of a texture which renders it susceptible of a fine polish as well as of being readily wrought by the chisel. There are also black chloritic steatite and chlorite slate near the Variety mills in this county.

NEW KENT COUNTY

formed in 1654 from York. It is 26 miles long and 9 miles wide. It is between the Pamunkey, York and Chickahominy rivers. The surface is generally level and the soil light and sandy. Soil on the streams very fertile. The population is 4,381. Number of acres of land, 129,555; assessed at \$379,120. Number of horses and mules, 819; cattle, 1,972; swine, 870; swine, 3,462. Land can be bought at \$2 to \$5 per acre. The principal productions are wheat, corn, tobacco, peas and vegetables. Marl of the best quality exists, and has been very profitably used. The Richmond and York River railroad passes through this county; so that it is furnished with cheap transportation by railroad, or by the Pamunkey, and the York and the Chickahominy.

The marl near St. Peter's church in this county, is richer, perhaps, or purer in carbonate of lime, as any other marl in the State, containing 90 per cent. lime. It has been used for mortar in laying bricks. The people are noted for their hospitality and sociability.

NORFOLK COUNTY.

This county was formed in 1691 from Lower Norfolk, which was afterwards changed to Nansemond, and lies on Hampton Roads between Nansemond and Princess Anne, and extends to the North Carolina line. It is 24 miles long with a mean width of 19 miles. In the southwest part of the county lies the Dismal Swamp, which, with Elizabeth river and its branches, affords ample drainage for the county. The population is 46,702. It has 266,000 acres of land, assessed at \$3,231,142. Number of horses and mules, 2,613; cattle, 2,266; sheep, 924; swine, 8,284. The surface is generally level; soil sandy, with clay subsoil; price of land, \$8 to \$25 per acre. Productions corn, oats, peas, peanuts and vegetables. Early vegetables for the northern cities are raised in enormous quantities and bring a large amount of money into the county. Fish and oysters form a large part of its trade. The city of Norfolk, a port of entry, and the principal trading and seaport town of Virginia, is 220 miles from the base of the Blue Ridge mountains, and almost within hearing of the deep-toned roar of the Atlantic ocean. The natural advantages of its harbor, which admits vessels of the largest size, and its close proximity to the ocean and Chesapeake Bay, make it the best shipping port for Virginia and North Carolina and a large portion of the trade of the West and Southwest. It is the terminus of the Atlantic, Mississippi and Ohio railroad. There are steamship and canal packet lines, which give it ready communication

with all the principal cities and States in this country and Europe. Norfolk ranks as the third cotton market in this country, and first in the oyster trade. The population of Norfolk is about 25,000.

This county is particularly adapted to the "trucking" business, as the soil is rich and moist, and all kinds of vegetables and fruits thrive and produce abundantly, the quality of the products being unsurpassed.

Portsmouth, a city of 10,000 inhabitants, immediately opposite Norfolk on Elizabeth river, is the northern terminus of the Seaboard and Roanoke railroad, and the southern terminus of the bay line of steamers from Baltimore, which lines form an important link in the chain of communication between the North and South. The United States navy-yard is at its southern extremity, in what is called Gosport, where the general government has a large and costly dry-dock, built of the best materials and workmanship, and capable of admitting the largest vessels.

Norfolk county, with a market for everything at its very door, with all the means for cheap living, its lands yielding remarkably well with the cheapest cultivation, with good health, with good society, and hospitable inhabitants, affords great advantages to its people and to immigrants.

In this connection, we will say something of the "trucking" business of this county and of those contiguous to Norfolk city. We have been favored with a copy of the *Norfolk Virginian* of August 5th, 1879, containing many valuable and interesting statistics of the trade of Norfolk city, and the productions and exports of the surrounding counties. This issue contains a valuable and instructive letter, headed "*Truck—Norfolk the Greatest Shipper of Garden Vegetables in the World*," from Mr. Leighton, President of the Horticultural and Pomological Society, from which we glean, in a condensed form, the following information:

"The *trucking* business commenced in 1842. The first vegetables shipped were cucumbers and early peas. For the former they frequently realized from \$40 to \$50 per barrel, and the latter from \$15 to \$20 per barrel, for first lots.

"Tomatoes were grown in a small but increasing way, and realized from \$6 to \$8 per bushel; the same of beans, summer squashes and Irish potatoes, which crept gradually in.

"A Mr. Bates was the first to introduce sash for starting vegetables, and was regarded therefor a fit subject for the lunatic asylum. Only about half a dozen different varieties of vegetables were cultivated up to 1857 for shipment. * * * In 1861, or about that time, there were three steamers plying weekly between Norfolk and New York, of the following capacity, namely: 1,500 barrels, 1,800 barrels, and one of 2,000 barrels, and they rarely running full. Contrast this with the present, with steamers of ten times their capacity, and leaving so much on the wharf as to fire

quently call a second and sometimes a third one into requisition to remove the accumulations of a single day, and this is but a counterpart of all the regular steam lines leading from this port. Irish potatoes, raised in a comparatively small way by the early gardeners, received an impetus in cultivation after the war, and reached in 1868 50,000 barrels, which was increased in the ten succeeding years to 275,000.

"The first shipment of cabbage to New York from Norfolk was made by Samuel Patterson in 1858, and sold for 25 cents per head. The shipments increased to 26,000 in 1868, and 160,640 in 1878.

"Kale had not been sufficiently tested in 1868 to make any note of shipments, while in 1878 there were 55,000 barrels shipped.

"The cultivation of small varieties of strawberries commenced about 1842, and shortly after attempts at shipping to northern ports took place. A few persons succeeded in shipping the smaller varieties with profit. The Wilson's Albany was first sold in 1858, at from \$1 to \$1.25 per quart.

"The cultivation of this berry has increased to such an incredible extent as to reach the yield of three millions of quarts in 1878. These berries are picked mainly by our colored females, some coming from a distance and camping for the brief season.

"In contrast with the early days of strawberry culture we have one cultivator who has employed on one occasion as many as 1,700 pickers, and has about 150 acres of berries under cultivation.

"While in 1857 there were only about a half dozen different varieties of vegetables shipped, and in 1868 the report of the Norfolk Horticultural and Pomological Society recorded only eleven varieties in their list of garden shipments (now styled truckers' shipments), with the estimated value of one million dollars, in 1878 the list of vegetables and fruits reached thirty-five varieties, and notwithstanding the shrinkage in prices occasioned by the panic, the enormous increase of production carried the value up to about one and a half millions of dollars.

"No section of our Atlantic coast is more favorably located for reaching the various markets, and none better supplied with rapid transportation facilities, and with the adaptation of the northern markets to this increasing production this port must ever remain the great supplying centre of the Atlantic coast for early vegetables.

"Glass culture, so much ridiculed in 1842 for starting vegetables, increased to not over 200 sashes in Norfolk county in 1845. Now a single trucker has from three to five hundred sashes. The value of under glass culture in this vicinity is being annually better understood, and is destined to occupy a more prominent place. To illustrate the effect of this vast interest upon the value of real estate, where well adapted to this particular branch of farming, one farm sold in 1842 for \$4,000, a few years later sold for \$6,000, and in 1855 sold for \$18,500.

"In 1844 there were but two truck farms in the Tidewater section, and they were upon the Western Branch, while now for a distance of ten miles upon both sides of that river is a series of truck farms; and, in fact, this interest has spread itself over not only Norfolk county, but all the contiguous counties, and in its management the lines of improvement are annually drawn closer, until it may now be regarded a profession.

"The cultivation of fruits has kept pace with horticulture. As an index of the adaptability of our soil to the culture of the pear, six out of the twenty silver medals intended for distribution by the American Pomological Society for the whole of the United States and Canada, were awarded to persons in the three counties of Princess Anne, Norfolk and Warwick.

"In no department of our recent progress is there more visible improvement than in our roads. The old roads that were at times almost impassable fifteen years ago are giving place to beautiful shell roads that render a drive a pleasure, and enable the truckers to move double the loads to market as formerly with a similar team.

"To give an idea of the extent that seeds have been used, one trucker informed me that some years ago he planted from 50 to 60 bushels of seed-peas for early shipments, while some others planted as many barrels, and from three to five bushels of cucumber seeds, and when the misfortune of a frost occurred, parties were obliged to go in person to the North to supply the deficiency."

The amount of "truck" produced about Norfolk amounted in 1878 to \$1,751,645.34, and consisted of the following crops: apples, asparagus, artichokes, beans, beets, strawberries, blackberries, whortleberries, raspberries, gooseberries, cherries, cabbages, citron, cucumbers, cauliflower, kale, lettuce, onions, peaches, pears, peas, Irish potatoes, sweet potatoes, radish, squash, spinach, tomatoes, turnips, watermelons, grapes and other vegetables.

The exports of Norfolk amounted in 1878 to \$10,052,062, in cotton, corn, staves, timber, &c. The oyster trade amounted to \$350,000, and the pea-nuts to \$600,000.

NORTHAMPTON COUNTY

Is one of the original shires into which Virginia was divided. It is the southernmost of the two counties forming the Eastern Shore of Virginia. It is 30 miles long by a mean width of about five miles. The surface is level, and the soil light, sandy, and alluvial. The population is 8,046. It contains 100,100 acres of land, assessed at \$952,669. Number of horses and mules, 1,682; cattle, 3,804; sheep, 1,798; swine, 7,660. The price of land is \$5 to \$12. The productions are corn, oats, potatoes and early vegetables and fruits. Number of acres in timber, 50,000; cultivated, 25,000 (some marsh lands not arable). There are 20 public schools in this county.

There are 19 churches, of which 10 are Methodist—6 white and 4 colored ; 6 Baptist—3 white and 3 colored ; 2 Episcopal and 2 Presbyterian. The health of the county is good. Lying between the Atlantic ocean and Chesapeake bay, with numerous islands on the Atlantic side, it has the most extensive tidal fronts of any county in the State. The fish, oysters and wild fowl form a source of luxurious living and large revenues to the inhabitants. There is no county in the state cheaper to live in than this. Its cultivation is exceedingly cheap, as a one-horse plough is sufficient generally, and horses require no shoeing, and vehicles and farming utensils will last double as long as in the mountain regions. For "trucking" purposes it is unsurpassed. Transportation to market by water is cheap. Fruits generally escape frost. The society is excellent, and the people exceedingly hospitable and willing to extend to immigrants a cordial welcome. The lands are productive, and seem to keep up their productive capacity though cultivated every year in corn, oats and "trucks;" and they have been thus cultivated since the settlement of the county—one year in corn, the next in oats, the next in corn, and then in oats, and so on ; the trucks taking in some places the place of corn or oats. The lands are renovated in some measure by burned oyster shells, and the "Magothy Bay bean," which comes up as soon as the oats are cut, and by commercial fertilizers, which are considerably used. But there is no doubt but what the damp sea air, loaded with salt, which constantly sweeps over the county, aids the growth of crops very much.

NORTHUMBERLAND COUNTY

Is one of the five counties constituting the "Northern Neck," which lies between the Potomac and Rappahannock rivers and Chesapeake bay. The surface is mostly level. The soil on the streams is a sandy loam, with clay subsoil, and is very well adapted to wheat. The ridge lands have a light soil, and are generally thin, but easily improved. The farm crops are corn, wheat, oats and trucks, or green vegetables for city consumption. Almost every part of the county is accessible to water transportation by the creeks and estuaries from the bay and Potomac, and the cities of Alexandria, Georgetown and Washington are largely supplied from this county with melons, fresh vegetables, oysters, fish, wild fowl and poultry. There are valuable fisheries in this county. "Fish chum," or the refuse from fish-oil factories, is largely used as a fertilizer here, as well as in many other counties of this section, especially on wheat, with marked benefit. There is marl in this county, but none used now, though it was formerly used. Gypsum is of no benefit to the soils of this county. The products of this county are ample for the support of its population, and afford large and

valuable exports. Eight hundred to one thousand barrels of eggs and large quantities of turkeys are annually sent to market. Farmers are generally out of debt. There are only two lawyers in the county. There has been no occupant of the county jail for months. Only thirteen inmates in the almshouse*. The county levy is very low. There are only two bar-rooms in the county. A fine wheat crop made this year (1877) gives a bright picture of a prosperous community, which we have from a correspondent from Northumberland, with price of land from \$3 to \$50. Population, 6,863. Number of acres of land, 117,777, assessed at \$808,-392. Number of horses and mules, 1,016; cattle, 4,031; sheep, 1,883; swine, 5,117. Northumberland county was formed in 1648. It is 30 miles long and about 12 miles wide. This is a fine part of Virginia, and offers pleasant homes and good inducements to immigrants.

MIOCENE MARLS—ANALYSIS.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
John Fulk's.....	Light blue, fragments of shells.....	17.0
Walter Rice's.....	Very ferruginous and compact, with fragments of shell } mixed with green sand..... }	6.8
Mr. Hedley's.....		
	Yellow; green sand, a trace.....	21.5

NOTTOWAY COUNTY

Was formed in 1788 from Amelia. It is 22 miles long and 12 miles wide. The surface is gently rolling. The soil on the streams is productive. It is drained by the tributaries of Nottoway and Appomattox rivers. It lies southwest from Richmond, and is bounded on the north by Amelia, on the west by Prince Edward, on the south by Lunenburg, and on the east by Dinwiddie. The principal crops are tobacco (for which this county is noted), corn, wheat, oats, &c. Population, 9,291. Number of acres of land, 196,207, assessed at \$482,911. Number of horses and mules, 1,293; cattle, 3,943; sheep, 1,131; swine, 4,873. Land sells at \$5 and \$10 per acre. About one-fourth of the land is in timber, consisting of the different varieties of oak, pine, hickory, maple, walnut, beach, poplar, ash, gums, dogwood, cedar and sassafras. One-half of the surface is in cultivation. The average yield per acre of the main crops reported by correspondent: Tobacco, 1,000 pounds (a very large crop); of wheat, 8 bushels; oats, 12½ bushels; clover-hay, 1 ton.

*This was in 1877.

There are 25 public schools in the county; 25 churches of the various denominations. Burkeville, near the western boundary of the county, is the point of junction of the Danville railroad with the Atlantic, Mississippi and Ohio railroad. It is a thriving village. These two roads, entering the county at different points on its western and northern boundaries, afford transportation facilities to a large extent of its territory. This, with other counties in Middle Virginia, constitute probably the healthiest region of the State. This county itself is remarkably healthy, and the people kind and hospitable, and ready to welcome new settlers among them. Steatite and kaolin are found in this county.

ORANGE COUNTY

Was formed in 1784 from Spotsylvania, and derives its name from the color of the soil. It originally comprised the whole of Virginia west of the Blue Ridge. Now its greatest length is 22 miles, with a variable width of from 5 to 20 miles. It is bounded on the north by the Rapid Ann river, on the east by Spotsylvania, on the south by Spotsylvania, Louisa and Albemarle, and on the west by Albemarle and Greene. The surface is generally hilly and the soil of a deep red hue, indicating a large percentage of iron, of which mineral large veins have been found. A happy combination of horticultural, agricultural and mineral wealth is here blended in places within a small space. The forest, field and garden are alike productive. The crops usually grown are grass, corn, tobacco, wheat and oats. As a grass-growing and grazing county this should yield precedence to no other. It is drained by the Rapid Ann and North Anna rivers, and their numerous tributaries, which also furnish many sites for mills, &c. The population is 10,396. Number of acres of land, 213,508, assessed at \$2,216,892. Number of horses and mules, 3,026; of cattle, 6,301; of sheep, 6,453; of swine, 8,448. The average price of land is about \$10 per acre, though some of the more improved lands sell very high. It is traversed by the Chesapeake and Ohio railroad at its south border, and centrally by the Virginia Midland railroad.

The timbers consist of very large growths of the various kinds of oak, hickory, pine, chestnut, and in the valleys poplar and sycamore. Red and brown hematite, and magnetic iron ores are very abundant and rich, and lie convenient to railways. Limestone, much of it very hydraulic, is found at the base of the southwest mountains, also marble of great fineness and beauty. Gold and plumbago are also found, the former in that part of the county adjoining Spotsylvania. Gordonsville, in the southern portion of the county, at the junction of the Virginia Midland railroad with the Chesapeake and Ohio railroad, is a flourishing and fast improving

town. It contains several manufactories, two hotels, a newspaper office, several mills, and a number of fine stores and good schools. Orange courthouse is 80 miles northwest from Richmond. It is a growing village of about 800 inhabitants.

PAGE COUNTY

Was formed in 1831 from Rockingham and Shenandoah. It is 30 miles long and about 11 miles wide, and consists in one entire valley, with Shenandoah river running through its whole length from north to south, and the Blue Ridge on the east and Massanutten on the west. The soil is a rich limestone, very productive.

Population, 8,452. It contains 193,119 acres of land, assessed at \$1,581,167. Number of horses and mules, 2,549; cattle, 5,973; sheep, 3,930; swine, 7,632. The productions are wheat, corn, oats and grass. This is one of the finest counties in the State. The lands are very rich, and are held at highest prices. It is traversed in its entire length by the Shenandoah Valley railroad.

The valuable timbers are pine, the various oaks, locust, poplar, chestnut, ash, walnut, &c. The minerals are iron ores in vast quantities, ochre, manganese, copper, limestone and travertine or "deposit marl."

A very remarkable cave of vast extent has lately been discovered near Luray, the county seat, which bids fair, on further exploration, to rival if not eclipse all the caves of the world. Luray is a flourishing village, decidedly on the increase. This county is considered very healthy, and has a delightful summer climate.

Analysis of iron ore from Fox mountain, used at Mr. Forrer's furnace (by Professor Rogers), showed, in 30 grains, 20.60 of protoxide iron, or about 67 per cent., with no phosphorous; the color a dark brick red, or brown. From same locality, another specimen, in 30 grains, contained 23.93 grains of protoxide iron; no phosphorous; color very deep brown, shining lustre, texture compact. Another specimen from Blackford's bank, used at Isabella furnace, contained 22.19 grains of iron out of 30 grains; no deleterious constituent. Another from Blackford's mine, west side of Big Fort valley, dark brown texture, compact, but largely cavernous, contained 22.30 grains protoxide iron out of 30 grains; no deleterious substance. Another from Little Fort mountain, Massanutten mountain, color dark brown, texture compact generally, contained 20.70 grains; nothing deleterious. There are other analyses of iron ores in several other localities, averaging from 21 to 24 of iron (in the 30 grains)—of about the same character as those described.

Magnesian limestone is found in this county. A specimen from near Blackford's furnace contained of carbonate lime about 43 per cent., of car-

bonate magnesia about 33 per cent., silica 4 per cent., and alumina and iron 1 per cent. Another specimen from the lower stratum of Dr. Blackford's mill-race contained about the same percentages. The ordinary carbonate of lime also exists. A specimen from near Luray contains of carbonate lime 78 per cent., of carbonate magnesia 11.37 per cent. It has been proposed to use this as a flux for iron.

PATRICK COUNTY

Was formed in 1791 from Henry, which bounds it on the east, with Carroll, Floyd and Grayson on the west, and the North Carolina line on the south. The surface is broken. That portion lying south of Ball mountain is well suited to the growth of wheat, corn and tobacco; the portion called the "Meadows of Dan," is a grass growing region, level, with soil remarkably rich and productive. Population, 10,161. It has 277,219 acres of land, assessed at \$934,944; horses and mules, 1,863; cattle, 5,187; sheep, 4,603; swine, 11,273. The productions are ample for the support of the inhabitants, and consist in tobacco, wheat, corn, oats and stock. The climate is healthy and agreeable; the lands cheap, and the people kind and hospitable. With a railroad, which will be supplied in the near future, there are few localities more inviting for new settlers.

Iron ore of the finest quality is abundant. Lead ore of good quality is found, and in the southern portion of the county silver ore, which was formerly worked to some extent. It contains granite and sandstones for building purposes, and there are several sulphur springs.

A considerable portion of the western part of the county is mountainous and unimproved; and here, no doubt the Angora goat would be a profitable animal to raise.

PITTSYLVANIA COUNTY

Was formed from Halifax in 1767. It is located on the North Carolina line, with Halifax on the east, Campbell and Bedford on the north, and Henry and Franklin on the west. It is 35 miles long and 26 broad. The county is well drained by Dan river on the south, Staunton river on the north, and Banister river, which passes through its central portion. The Richmond and Danville railroad crosses the county at its southeastern angle. The Virginia Midland road traverses the middle portion from north to south. A contract has been let for building a narrow-gauge railroad from Rocky Mount, in Franklin, to Ward's springs on the Danville railroad, in Pittsylvania. The soil is mostly productive on the hill lands, but the bottoms on the rivers are very rich, especially the Dan river bottoms. Population in 1870, 31,343. It is the third largest county in the

State, and contains 629,810 acres of land, assessed at \$3,553,153. Number of horses and mules, 5,595; cattle, 10,901; sheep, 5,337; swine, 19,870. Lands are worth from \$4 to \$10 per acre. The productions are tobacco, corn, oats and wheat. The tobacco raised in this county is mostly the bright wrappers, and sells at very high price; it is the main money crop. There are some valuable timbers, hickory and white oak predominating. Iron ore of excellent quality is abundant in the northern and western portions of the county, and coal of the finest quality is found along the North Carolina border. Plumbago, limestone and white marble are found in various sections of the county; also gold, manganese, lead, copper, iron, steatite, asbestos and ochre. Danville, in this county, is one of the chief tobacco marts of the State. Its population in 1876 was nearly 9,000, and has been steadily increasing since. There are thirty large factories here in operation, and others in course of construction, and double as many repressing establishments. The health of the county is very good. It will be seen from the above that its mineral wealth is very decided, and no doubt before many years will add greatly to its productive interests. Already an iron mine of very fine ore has been opened on the line of the Midland railroad, and a contract has been made to carry large quantities of iron to Harrisburg, Pennsylvania.

POWHATAN COUNTY

Was formed in 1777 from Cumberland. It is 25 miles long and 15 miles wide. The surface is rolling and the soil very good, with generally a clay sub-soil. The James and the Appomattox form two boundaries, and with their numerous tributaries give excellent drainage and good water and much fertile low grounds on their margins. Population, 7,667. Number of acres of land, 179,200, assessed at \$1,170,896. Number of horses and mules, 1,172; cattle, 2,489; sheep, 2,484; swine, 5,526. Good land can be bought for \$8 per acre, with moderate improvements. The productions are tobacco, corn, wheat and oats. Much of the soil is adapted to grass, and with a "dog law" sheep would be very profitable. The county is self-sustaining, and sells large quantities of tobacco and wheat. The Atlantic, Mississippi and Ohio railroad touches the southeast corner of this county.

This county has mica, plumbago, coal and kaolin.

No section of the state is healthier than this. It is above malarial influences, and below the cold and damp of the Piedmont and mountain regions during the winter. It is an excellent part of the State to live in, and immigrants will find good homes here, with an intelligent, hospitable people, with churches and schools convenient.

Two coal mines are being operated in this county, one at Norwood, by Mr. Edwin Duval, and the other at Powhatan Old Pits, latterly known as the Old Dominion mines, operated by a company of the latter name. They are shallow mines, and are not worked on a large scale.

PRINCE EDWARD COUNTY

Was formed in 1753 from Amelia. It is 35 miles long, and 12 miles wide. This county lies on the Appomattox, 50 miles southwest from Richmond. The surface is rolling, and the lands are generally of good quality, and there are some very fine estates in the county. Farmville, the principal town, is situated in the northern part of the county, and is a thriving place of about 2,500 inhabitants. It is a place of considerable importance as a tobacco manufacturing centre, being the fifth largest in the State. The Atlantic, Mississippi and Ohio railroad passes through this county near its northern border, and through the town of Farmville.

Prince Edward has a population of 12,000. Number of acres of land, 224,853, assessed at \$2,056,388. Horses and mules, 1,509; cattle, 3,384; sheep, 1,859; swine, 4,350. The soil is of a gray color, and is easily improved. Improved lands are worth \$8 to \$12 per acre; unimproved from \$1 to \$5 per acre. The productions are tobacco, corn, wheat and oats, and are ample for the support of the inhabitants. Tobacco and wheat are the main money crops.

"Hampden-Sidney college," under the auspices of the Presbyterians, a seat of learning of high reputation as a training school for professional studies and business life, is situated in this county. The "Union Theological seminary," a Presbyterian institution, is also in this county, near to Hampden-Sidney. The society is refined and educated, and this county is as healthy as any in the State, and particularly so in the vicinity of these institutions. Hampden-Sidney is probably as healthy a point as any in the State.

PRINCE GEORGE COUNTY

Was formed from Charles city in 1702. Its average length is 21 miles, and its breadth 15 miles. The surface is mostly level and the soil thin, except on the rivers, where the land is very fine. It lies on the south side of James river, with Appomattox river as its northwest boundary, Dinwiddie on the west, and Sussex and Surry on the south and east. It is drained by numerous smaller streams in addition to the two rivers above mentioned. City Point, at the confluence of the Appomattox and James, is a place of some commercial importance, being one of the shipping points for goods transported by the Atlantic, Mississippi and Ohio rail-

road, which has a branch line from it to Petersburg, of nine miles in length. This place formed the base of supplies for the Federal army during the siege of Petersburg.

Population of the county, 7,860; number of acres of land, 180,537; assessed at \$1,246,846. Number of horses and mules, 1,354; cattle, 61,20; sheep, 657; swine, 4,564. Land sells at from \$2 to \$20 per acre. Its productions are wheat, corn, oats, peanuts, cotton and tobacco. The light, warm lands of the southern portion of the county are well adapted to the peanut, and it is there a very profitable crop. Some cotton is also raised in the lower part of the county. The farm products are ample for the use of the people. Marl of various descriptions is abundant in this county, and has been extensively used and with good results. Near Coggin's Point, and at other places, is found the valuable green sand marl, and this was the locality where the late Edmund Ruffin conducted many of his experiments in marling, and demonstrated its value. The Atlantic, Mississippi and Ohio railroad passes through this county. Below are some analyses of the marls of this county.

MIocene MARLS.

LOCALITIES.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
Coggin's Point.....	Small shells and fragments—Intermixed with green sand....	28.4
Mr. Prentice's.....	A great variety of shells.....	53.6
Evergreen.....	Fragments of shell.....	32.9
Tarbay.....	do. do.	19.4
Coggin's Point.....	Yellow—friable—no trace of shells—a little green sand.....	64.7
do.	do. do. do.	37.5
Maycox.....	Yellow—no trace of shells—silicious.....	42.3
do.	{ Light—compact—containing impressions of shells—inter- mixed with green sand..... }	73.8
do,		
do,	(Mouth of Powell's creek.) do. do. do.	42.0
Mr. William Harrison	White pulverulent.....	72.7

COMPOSITION OF EOCENE MARLS.

Tarbay (upper stratum)—Gypsius earth, containing from 6 to 10 per cent. of gypsum, and from 10 to 15 per cent. of green sand.

	Per cent.
Tarbay (lower stratum)—Silica and alumina, &c.....	40.
Carb. lime.....	3.
Grden sand.....	57.

PRINCESS ANNE COUNTY

Was formed in 1691 from Norfolk. It is 30 miles long, with a mean breadth of 12 miles. It lies on the Atlantic ocean, with Chesapeake bay on the north, Norfolk county on the west, and the North Carolina line on the south. The surface is level and the lands are generally good; the best are the swamp lands in Holland swamp, Eastern Shore swamp, and Blackwater. There are also fine lands on the borders of the creeks and inlets. A large portion of the county is devoted to truck farming, and immense quantities of vegetables and fruits are annually shipped to northern cities. Lynnhaven river, North river, Back bay, and their tributary streams, and the eastern branch of Elizabeth river, are all navigable for small vessels. The fisheries on Cape Henry beach, Lynnhaven bay and river, are very valuable. As fine oysters as any in the world are taken from the waters of Princess Anne county.

Population, 8,273. Number of acres of land, 165,033, assessed at \$1,167,943. Horses and mules, 1,840; cattle, 4,443; sheep, 3,028; swine, 9,044. Land sells at \$5 to \$25 per acre. The main products are corn, oats, potatoes, "trucks," fruits, fish, oysters, terrapins, crabs, and wild fowl. Fruits are very profitably cultivated.

The lands are very cheaply cultivated, and living cheap and abundant. The nearness to market takes away almost all expense of transportation of produce—a matter of great import to the farmer.

The "Seaboard District," which comprises the northeast angle of the county, is the best timbered region of lower Virginia. The chief timber is oak, pine, gum, cypress, cedar, holly, persimmon, elm, &c. There is a deficiency of easy transportation. Some improvement in the navigation of Lynnhaven river, and, above all, a narrow-gauge railroad would open the way to millions of dollars' worth of timber and cord-wood. For health and longevity this county will compare favorably with any portion of Tidewater Virginia, if not with some of our cities. Much attention has been paid to the cultivation of fruit. Kaolin of good quality for fire-brick is found in this county. The texture of the soil varies greatly in different portions of the county.

PRINCE WILLIAM COUNTY

Was formed in 1730 from Stafford and King George, and lies on the Potomac river, with Fairfax on the north and Stafford on the south. The surface is rolling and well watered, and some parts of the country contain as many farms as are to be found in the State. This section was greatly devastated by the armies during the war, the effects of which have, however,

been almost entirely removed by the energy and industry of the old inhabitants, as well as by the efforts of a very large number of settlers that have come in since the war.

Population, 7,594. It has 221,670 acres of land, assessed at \$2,387,287. Number of horses and mules, 2,329; cattle, 6,163; sheep, 8,307; swine, 6,212.

About one-half the surface is in timber of oak, pine, chestnut and hickory; one-half the surface is cultivated, and produces rye, corn, oats and hay. Price of land from \$5 to \$35 per acre. The average yield per acre: Wheat, 12 bushels; oats, 15 bushels; hay, 1 to 2 tons. There are 35 schools, of which 30 are public schools and in good condition; there are 16 churches—5 Episcopal, 5 Baptist, 4 Methodist, and 2 Presbyterian. The main line of the Washington City, Virginia Midland and Great Southern railroad traverses this county in a southwestern direction, and the Manassas division in a western direction. The upper part of the county is adapted to wheat, corn, grass, fruits, &c., while in the lower part trucking is the main business. The minerals found here are gold, copper, baryta, slate, soapstone, and brownstone (for building), marble and limestone. Manassas, a thriving village now, was the theatre of the first great conflict between the North and the South in the late war.

PULASKI COUNTY

Was formed in 1839 from Wythe and Montgomery. It is 25 miles long and 18 miles wide. The surface in some parts much broken, and in others level. The soil is very good, and adapted to grain and grazing.

Population, 6,538; number of acres of land, 192,921, assessed at \$1,720,447; number of horses and mules, 1,793; cattle, 7,557, sheep, 3,434; swine, 6,257.

The county is situated in the famous Southwest Valley, and is noted for its rich hays and grasses and fine stock. Gypsum acts well here, as in almost all the Piedmont and Valley and mountain section. The Atlantic, Mississippi and Ohio railroad runs through it. Newburn is the county seat, and from similarity of location is supposed to have been named from Bern, Switzerland.

Baltimore butchers concede that the beef from this county is among the best grass beef that comes to that market. The production of corn, wheat, rye, oats, buckwheat, barley and tobacco is equal to the best counties in the southwest. Grapes do well.

Many different kinds of ores are found in large quantities. The Radford furnace has been in operation for several years. The ore is inexhaustible and of the finest quality. A vein of zinc ore 15 feet thick has

been found on the lands of D. S. Forney, and in other places, lead, copper, manganese, &c. In the northern portion of the county, on Brush mountain, there are two veins of coal—one two feet and the other about nine feet thick. This vein has strata of slate interlaid with the coal, and is of soft character. The small vein is hard, and of the best quality. Banks have been opened on the lands of John W. Howe, J. H. Tyler, James M. Cloyd, and others, and the coal has been used for local purposes for many years.

Recently Captain W. T. Hart has discovered the large vein near Martin's station to be (23) twenty-three feet, and is now constructing a narrow-gauge railroad to that point on the Atlantic, Mississippi and Ohio railroad, and proposes to mine extensively. He has associated with him Colonel George W. Palmer, of Saltville, and others. They are chartered under the name of the Altoona Coal and Iron Company.

The Altoona coal and iron company have purchased what is known as the Robertson tract, consisting of some 20,000 acres, embracing the land lying between the tops of Little Walker and Tract mountains. The company have just completed a narrow-gauge railroad, which strikes the Atlantic, Mississippi and Ohio railroad at Martin's. This road runs northward along the Tract Fork, at the northern end of Tract mountain, until it gets into the valley between this mountain and Little Walker, and then takes a westward direction, striking at its terminus a point 100 feet from the top of the lower and western end of Little Walker mountain, eight and a third miles from Martin's. At this point there is a tunnel wide enough for two tracks, fifty feet in length through the clay and sand, where it reaches a vein of soft coal, 22 inches wide. Going about 10 or 15 feet it strikes another vein of coal of about the same character, and then 15 or 20 feet another vein of hard coal $2\frac{1}{2}$ or 3 feet thick. This vein is the one that is being worked, and already the mining has progressed sufficiently as to have ready six acres of coal for transportation as soon as the cars are put upon the road. The average product of a vein one foot thick per acre, is 22,000 tons, so that six acres of a three feet vein would be 396,000 tons that the company will have ready soon to put upon the market as fast as taken and hauled from the mines.

The coal crops out on the tops of Little Walker and Tract mountains for the distance of five or six miles, extending as far as the Cloyd mines, and from the dip on each mountain it is believed that the substratum of the whole valley between these mountains is one solid mass of coal. This valley contains some of the best grazing lands in Pulaski county.

The 22-inch and 18-inch veins spoken of are soft coal and will be used for furnaces and the manufacture of salt. The distance from the surface

being only one hundred feet, the pressure is not sufficient to solidify it, but the company propose when the 3-feet vein is exhausted to tunnel at a point lower down the mountain to strike this inexhaustible bed of hard coal.

The mines are worked by Welshmen who mine lying flat of their backs. The cars are pushed in by a mule with a pad upon its breast, through the main tunnel to the 3-feet vein, where it follows the vein, passing a lateral branch from the main track about fifty feet from the mouth of the main tunnel, and upon this branch the cars are switched off and brought out loaded—(*Abingdon Virginia*).

There are valuable veins of limestone, and fine building stone can be gotten. The timber embraces all the varieties found in this region, viz: oak, pine, hickory, poplar, cedar, cherry, ash, walnut, maple, locust, sycamore, &c.

There are many streams affording valuable water-power for mills and manufacturing establishments. At Snowville, a thrifty village, they have a woolen mill, a foundry, agricultural implement shops, and other machinery. Dublin, Martin's and New River are railroad stations. The shipments from Dublin are said to be second to but one other point on the road.

There are many churches in the county, and schools are in a flourishing condition, and to all settlers a cordial welcome is extended by the citizens.

RAPPAHANNOCK COUNTY

Was formed in 1833 from Culpeper. It is situated at the eastern base of the Blue Ridge mountains, with Fauquier on the north, and Madison on the south, and Culpeper on the southeast. It is well watered by the tributaries and sources of the Rappahannock river. The lands are generally fertile and produce fine crops of corn, wheat, oats, barley, &c., and are finely adapted for grazing. The population in 1860 was 8,261. Washington, the county seat, is near the centre of the county. Woodville, Sperryville and Flint Hill are thriving villages. At Sperryville is located an extensive tannery with a capacity of tanning 30,000 sides per annum.

The county is well adapted, both by soil and climate, to the growth of grapes, apples and other fruits, and is a fine stock-raising county. Many of the finest horses, cattle and sheep exhibited at our annual fairs are from this county. Along the sides of the mountains are extensive forests of oaks, affording valuable bark for tanning. Rappahannock contains 170,770 acres of land, assessed at \$1,749,677. The number of farm animals is as follows: Horses and mules, 2,648; cattle, 7,944; sheep, 7,717; swine, 6,688.

The Manassas branch of the Virginia Midland railroad passes near this county, affording transportation to market for the products of her well-cultivated fields. It is a very healthy region, and altogether a very desirable portion of the State.

RICHMOND COUNTY

Was formed in 1692 from old Rappahannock. It is 30 miles long and about 7 miles wide. The low grounds are very fertile, producing fine crops of corn, wheat, oats and vegetables. The upper or forest lands are rolling, and the soil is a light sandy loam with red clay subsoil, susceptible of a high state of improvement, and is worth from \$5 to \$20 per acre. The river along its front abounds in fine fish and oysters, the shad and herring fisheries being very productive and profitable.

Warsaw, the courthouse, is situated about the centre of the county, six miles from the river, and contains a population of about 300.

Population, 6,503. Number of acres of land, 109,639; assessed at \$625,268. Number of horses and mules, 713; cattle, 4,044; sheep, 1,274; wine, 5,102.

There are 38,843 acres in timber, of oak, hickory, chestnut, pine, cedar, walnut, poplar, dogwood and maple. It is watered by Rappahannock river, Moratico creek, Farnham creek, Totrisky creek, Rappahannock creek, Menokin creek, and others; water-power good and ample. Acreage in wheat, 4,266—average yield, 6 bushels; oats, 500—yield, 8 bushels; buckwheat, 75; potatoes, 200 acres—yield 200 bushels; clover, 2,133—yield, 1 ton; orchard grass, 200—yield, 1 ton; in orchard, 1,277 acres—in apples, peaches, pears, plums, apricots and cherries. Number of stands of bees, 1,000.

There are 24 schools, of which 19 are public, and in good condition. There are 18 churches, of which 3 are Episcopal, 3 Methodist, 11 Baptist, and 1 Reformed. This is reported to be a tolerably good grass country. Sheep and bees reported very profitable. There are vast quantities of marl in this county, both blue and white marl, which has been used with good effect.

The winters are mild, cultivation of soil easy and cheap, living abundant and easily obtained, access to market very convenient, and altogether a very pleasant and desirable country to live in.

Three samples of blue marls in this county average 16.40 per cent. of carbonate of lime with some green sand.

ROANOKE COUNTY

Was formed in 1838 from Botetourt, and lies in the Roanoke Valley—the Blue Ridge forming its eastern boundary, with Botetourt on the northeast, and Montgomery on the southwest. The surface is broken, but the soil is very rich, and yields large crops of the staple products. This county, in common with all the others in this section of the State, is famous for its fine pasturage. It is 20 miles long and about 18 wide. It is watered by Roanoke river and its tributaries, and several of the confluent of the James.

Population, 9,350, Number of acres of land, 191,875, assessed at \$2,723,577. Number of horses and mules, 2,573; cattle, 4,646; sheep, 1,985; swine, 7,133.

The land sells from \$5 to \$60 per acre. The productions are tobacco, corn, wheat, oats and hay, and are ample for the support of its inhabitants. It is an excellent grass and stock county, lying partly in the Southwest Valley and partly in Appalachia. It is traversed by the Atlantic, Mississippi and Ohio railroad.

Salem, the county seat, is a beautiful and prosperous village, near the west bank of the Roanoke river, 178 miles southwest from Richmond, on the Atlantic, Mississippi and Ohio railroad.

The mineral deposits are very valuable, and there are several fine sulphur springs in the county. Iron ore is abundant. Roanoke College is located at Salem; it is under the influence of the Lutherans, and is in a very flourishing condition. Hollins' Institute, at Botetourt Springs, is a very popular female school. Roanoke Red Sulphur Springs is ten miles from Salem, surrounded by fine mountain scenery and fine lands. This is a very healthy region of the State, and offers excellent inducements to settlers from other States.

Big Lick, on the Atlantic, Mississippi and Ohio railroad, merits special notice as a very thriving, handsome village, noted for its manufacture of tobacco. Some of the largest warehouses and tobacco factories in the State are situated in this town. Tobacco production is on the increase in all this section.

ROCKBRIDGE COUNTY

Was formed in 1778 from Augusta and Botetourt. Its length is 31 and mean breadth 22 miles. The surface is rolling and mountainous, and the soil very rich and productive. It is watered by the North river and its tributaries. It flows through the centre of the county and unites with the James on its southern border. Population, 16,058. Number of acres of land, 408,951, assessed at \$4,379,482. Number of horses and mules, 5,300; cattle, 11,829; sheep, 5,644; swine, 12,041. The land in this county pro-

duces tobacco, corn, wheat and oats, and is finely adapted to grass and grazing purposes. It sells at from \$10 to \$50 per acre. This is a very healthy climate. The renowned Natural bridge is in this county.

This is one of the largest, most flourishing and populous counties in the State. It is situated in the Valley of Virginia, with Augusta on the north and Botetourt on the south. The lands through the central portion of the county are very rich and highly improved, while those on the eastern and western borders being very mountainous, are sparsely settled and comparatively little cultivated. The mineral deposits in this county are very rich, iron ore of great purity abounding in various sections, and a number of mines and furnaces being profitably worked. Limestone, cement, gypsum and baryta are also found. Lexington, the county seat, is situated on the North river, about 50 miles northwest of Lynchburg, and 196 miles from Richmond. It contains the Virginia Military Institute and Washington and Lee University, two eminent institutions of learning. This is a thriving town, surrounded by a beautiful country. In this county are some excellent mineral waters, principally the Rockbridge Alum and Jordan Alum Springs and the Rockbridge Baths.

Professor Rogers gives analysis of iron from McCormick's furnace. In 30 grains there were 23.57 of peroxide iron, or 79.50 per cent.; no deleterious ingredient; ore nodular; color ochreous and chocolate brown; texture rather cellular. Another specimen from same locality gave 24.58 of peroxide iron in 30 grains. Another, near Lexington, contained 25.62; nothing deleterious. Another specimen, from near Buffalo creek, contained 22.58 grains iron out of 30 grains; no deleterious substance.

White marble is found in several places in the Valley, but nowhere so abundantly and of such exquisite color and so fine a grain as in Rockbridge, about 5 miles from Lexington. It is susceptible of high polish with very even grain and of fine color. On North river, above the mouth of Buffalo creek, are found extensive deposits of hydraulic limestone. The Natural bridge is formed partly of this magnesian rock, which is eminently hydraulic. This contains about 53 per cent. carbonate lime and about 41 per cent. carbonate magnesia. That from North river contains about 36 per cent. carbonate lime and about 25 per cent. carbonate magnesia. That from near Glasgow, about 58 per cent. carbonate lime and about 33 per cent. carbonate magnesia, 7.0 per cent. silica and 0.83 per cent. of alumina and oxide iron. Whetstone of superior quality is also found in this county. Sand for making glass, of the finest quality, is found at the mouth of North river in this county, and should the Richmond and Alleghany railroad be built, the Kanawha coals can be transported to this point sufficiently cheap to establish here a great glass manufactory. This sand is reputed to be about as white as flour and free from all impurities.

ROCKINGHAM COUNTY

Was formed in 1778 from Augusta. It is 38 miles long and 23 wide. The surface is rolling and in parts mountainous. The soil is very fertile.

Population, 23,668; number of acres of land, 202,759, assessed at \$6,870,825; number of horses and mules, 8,030; cattle, 18,998; sheep, 8,166; swine, 21,136. The productions are wheat, corn, rye, oats, hay, pork, mutton, &c. This county raises a large amount of all farm products for sale. Land sells at from one to 140 dollars per acre. The Valley railroad runs through this county. This is one of the counties of the great Valley of Virginia, and is noted for good farms and good farmers, and is one of the richest agricultural counties in the State. It is well watered, the main stream of the Shenandoah running through the eastern portion, the North river draining the southern portion, the north fork of the Shenandoah running through the northeastern part, and Smith's creek, a branch of the latter, draining the central part. These streams afford fine sites for manufacturing purposes, and are utilized to a considerable extent. The flour manufactured in this county has a ready market. The county abounds in limestone, and marble of several varieties is found. Iron ore, copper and coal also occur—the iron and coal in considerable quantity. There are several foundries and furnaces in operation.

Harrisonburg, the county seat, is 122 miles northwest from Richmond, and is a flourishing town, and has, within the last few years, received an impetus by the completion to this point of the Valley railroad, which is designed to Salem, where it will connect with the Atlantic, Mississippi and Ohio railroad. It now terminates at Staunton.

This is a great grass and stock region, and persons who wish to immigrate to a country where they can carry on successfully this business, will find this an admirable locality. The "Rawley Springs," 11 miles from Harrisonburg, in this county, have obtained considerable reputation in the cure of disease. They are mainly chalybeate. Professor Mallet has made an analysis of the water of this spring, and says: "The above analysis shows that the water contains mainly carbonates of protoxide of iron and magnesia, dissolved by excess of free carbonic acid, and sustains the high reputation these springs have long had for the treatment of anæmic conditions of the system, functional uterine derangement, and other disorders in a which pure and active chalybeate is indicated." The Rockingham mineral springs, an admixture of sulphur and chalybeate waters, 13 miles from Harrisonburg, are highly spoken of. Both these springs are surrounded by a fine country and beautiful scenery.

Professor Robinson, of Baltimore, has analyzed these latter waters. Nos. 1 and 2 he calls saline souling waters. They contain iron in the form of

protoxide, and lithia and other alkalies, and sulphate magnesia. No. 3 he calls chalybeate. It contains iron in the form of carbonate, lithia and other alkalies, sulphate magnesia, and some arsenious acid. They all contain carbonic acid, sulphuretted hydrogen, oxygen and nitrogen gases. Professor Robinson "recommends these waters to the public as fully equal to any he has examined, and far superior to many of renown."

A shaded marble is found in this county; texture compact, very fine, and capable of fine polish, shaded with yellowish gray and slate colors. Hydraulic lime is also found, containing about 46 per cent. carb. lime, $1\frac{1}{2}$ per cent. silica and iron, and 38 carbonate magnesia. Another specimen, $8\frac{1}{2}$ miles west of Mount Crawford, has about 54 per cent. carbonate lime, 42 per cent. carbonate magnesia, $1\frac{1}{2}$ per cent. silica and 1 per cent. alumina and iron. Anthracite coal and iron are found in this county.

RUSSELL COUNTY

Was formed from Washington in 1786. It is 40 miles long and 34 broad. The surface is generally mountainous. Much of the land is not arable, but there are some very fine lands in the valleys. It is drained by Clinch and Sandy rivers.

Population, 11,103. Number of acres of land, 307,232, assessed at \$889,640. Number of horses and mules, 3,790; cattle, 12,829; sheep, 11,722; swine, 12,448. It has 61 schools, of which 56 are public and in good condition. There are 30 churches, of which 15 are Methodist and 15 Baptist.

This is a grazing and cattle raising county, but the farm products are ample for the support of the inhabitants. Land is worth from \$1 to \$40 per acre. It is a healthy county, situated in the fine section of the Southwest Valley. It abounds in timber, all kinds of oaks, walnut, chestnut, poplar, sugar maple, beech, elm, &c. It is well watered by the Clinch and its branches. The Atlantic, Mississippi and Ohio railroad is the nearest railroad to the county.

Iron ore is found in various parts of the county, and coal in the northern parts. This county lies in the southwestern part of the State, the Clinch mountains forming its south border, with Tazewell, Buchanan, Wise and Scott lying on the northeast, northwest and southwest. This county needs a railroad to develop its important resources.

It is said to have a large number of cattle, sheep and swine, and is an excellent stock county. The Angora goat, no doubt, would thrive and be profitable here, and in all the southwestern region, particularly on and near the mountains. Lebanon is the county seat.

SCOTT COUNTY

Was formed in 1814 from Lee, Washington and Russell. It is 24 by 23 miles in extent. The surface is mountainous and rolling, and the soil very good. It is drained by the north fork of Holston and Clinch rivers, and by Little Moccasin and Sinking creeks.

Population, 13,036. Number of acres of land, 379,830, assessed at \$792,705. Number of horses and mules, 4,394; cattle, 9,763; sheep, 14,085; swine, 18,685.

The productions are corn, wheat, oats, rye, grass, and a small quantity of tobacco. Price of land, improved, from \$5 to \$50 per acre; unimproved from \$1 to \$5 per acre. This county produces a large surplus, and with railroads would ship largely both of the products of the farm and of the mines. Two-thirds of the surface is in timber, consisting of the oaks, poplar, walnut, ash, lynn, beech, sycamore, elm and box elder. The average yield of principal crops: Wheat, 8 bushels; tobacco, 500 pounds; oats, 20 bushels; potatoes, 100 bushels; hay, 1½ tons. There are 2,000 acres in orchards of apples, peaches, pears, cherries, grapes, &c. There are 80 schools in the county, of which 70 are public, and are in a flourishing condition. There are 75 churches, 35 of which are Methodist, 20 Mission, 10 Hard-shell Baptist, and 10 Free-will Baptist. About 300 immigrants have settled in this county in the last five years. The health and climate are good. This county is a grass county and raises good stock. It is in the south end of the Valley, acknowledged as a good country. The nearest railroad is the Atlantic, Mississippi and Ohio.

This county is very rich in minerals, having abundance of iron ores, coal and limestone. It has many fine locations for mills and manufacturing establishments on the water courses, with ample power to run any amount of machinery. A railroad through this section would develop great resources. There are many mineral springs in this county, both sulphur and chalybeate.

A description of the iron and coal of this section, by Professor Lesley, will be found in that portion of this publication devoted to the geology of Virginia. In this county is found in great abundance a *mottled marble*, in which the colors are pleasingly blended with grayish white. The dun-colored and other varieties are also found.

SHENANDOAH COUNTY

Was formed in 1772 from Frederick. It is 32 miles long and about 15 wide. The surface is rolling and mountainous, with wide valleys on the

water-courses. The soil is extremely fertile in these valleys. It is watered by the north fork of the Shenandoah, running through the Valley in its entire length.

Population, 14,936; number of acres of land, 334,788, assessed at \$3,614,013; number of horses and mules, 4,597; cattle, 9,741; sheep, 6,600; swine, 11,832.

This is one of the finest Valley counties. It produces large crops of wheat, corn, oats, hay, and many sheep, cattle and hogs. It is a great grass and stock county, and the lands are in much demand. There are a number of fine farms in the county, and the farmers are noted for their thrift, intelligence and skill in the management of their farms. The Valley railroad passes through it.

Iron ore, coal, limestone, marble, manganese and travertine, or deposit marl, are found in various sections. There are several flourishing villages in the county, the principal being Edinburg, Hawkinstown, Mt. Jackson, New Market, Strasburg, and Woodstock. The last is the county seat. Shenandoah is one of the great flour-producing counties. The Orkney Springs, 12 miles from Mt. Jackson, on the railroad, have acquired a good reputation as a ferruginous tonic in various diseases.

Below are some analyses of travertine, or deposit marl, from Professor Rogers' Survey:

Marl from Tumbling run—Carbonate of lime.....	84.5
Marl from Hite's mill—Carbonate of lime.....	87.5
Marl from Brook creek—Carbonate of lime	85.2
Marl from Opequon river—Carbonate of lime.....	89.7
Marl from 6 miles north of Woodstock—Carbonate of lime.....	76.3
Marl from same locality—Carbonate of lime.....	91.0
Marl from White Plains, near New Market—Carbonate of lime.....	85.22
Marl from same locality—Carbonate of lime.....	79.54

In the county is found a *dun-colored marble* near New Market and Woodstock, and in other places. It is of close texture, and susceptible of a high polish.

A *mottled, bluish marble* is also found a little west of New Market, and may be traced for many miles. It is not so fine grained as the other, but takes a good polish, and is quite ornamental in appearance.

The *magnesian limestone*, halfway between Woodstock and Crabill's tavern, contains in 30 grains—

Carbonate lime.....	14.00 grains.
Carbonate magnesia.....	10.10 "
Silica.....	4.84 "
Alumina and oxide iron.....	0.54 "

There are other deposits of this limestone in other parts of the county

containing about the same percentages. Limestone abounds in the county, containing about 70 to 86 per cent. carbonate lime. A specimen from near New Market contains 86.16 per cent. of carbonate lime.

SMYTH COUNTY

Was formed in 1831 from Washington and Wythe. It is 30 miles long and 22 wide. The surface is mountainous, with three parallel valleys; drained by the North, South and Middle forks of the Holston. The soil in the valleys is very fertile.

Population, 8,898. Number of acres of land, 321,220, assessed at \$1,620,823. Number of horses and mules, 3,124; cattle, 7,657; sheep, 7,024; swine, 8,434.

It had in 1860 nine manufacturing establishments, with a capital of \$61,000, employing 97 hands, and yielding annually products valued at \$89,200 (Hotchkiss). The Atlantic, Mississippi and Ohio railroad traverses this county centrally. This is a fine agricultural and grazing county, and noted for its fine stock, and is located in one of the best portions of the State. The climate and health are very good.

The mountain lands produce blue grass spontaneously, upon which large herds of fat cattle are annually raised. Iron ore, baryta, limestone, gypsum and salt are found in great abundance. Marion, the county seat, is a thriving town, situated about the centre of the county, 275 miles southwest from Richmond, on the line of the Atlantic, Mississippi and Ohio railroad. It possesses a delightful, equable summer climate, and is thought favorably of as a summer resort for families. This is a fine section of the State; the soil among the best, and capable of a high state of improvement.

SOUTHAMPTON COUNTY

Was formed in 1784 from Isle of Wight. It is 40 miles long and 15 wide. The surface is level and the soil productive. It is watered by Meherrin, Nottoway and Blackwater rivers, furnishing a good supply of fish.

Population, 12,285. Number of acres of land, 366,698, assessed at \$1,450,128. Number of horses and mules, 2,283; cattle, 5,487; sheep, 2,237; swine, 15,269.

The principal productions are corn, cotton, peanuts and potatoes. Soil, a light sandy loam, with red clay subsoil. Price of land from \$3 to \$7 per acre. The products of the farms are ample for the support of the inhabitants. Marl exists in the county, and has been used successfully, though

not extensively. The Seaboard and Roanoke railroad runs through the southern portion of the county, and the Atlantic, Mississippi and Ohio railroad touches its northern limits.

Analysis of Miocene Marls of this County.

LOCALITIES.	OBSERVATIONS.	Per ct. carb. lime.
Near Massenburg's Mill.....	Bluish gray marl, shells decomposed, with much green sand.....	48.8
Mr. Massenburg's.....	Yellow fragmentary marl, with small shells, often entire.....	85.4
Monroe on Nottoway river.....	Bluish gray marl with shells, with green sand.....	37.3
M. Herring.....	Yellow marl, shells in great variety, with considerable green sand.....	30.0
Nottoway river, above Monroe.....	Blue marl, shells in a sandy clay, with a good deal of green sand.....	35.2
Nottoway river, above Monroe.....	Blue marl, shells in a sandy clay, with a good deal of green sand.....	20.0
Mr. Lawrence.....	Light, brownish gray, shells in clay, with a little green sand.....	29.0
Mr. Lawrence.....	Light, brownish gray, shells in clay, with a little green sand.....	20.0
Dr. Bowers'.....	Mottled brown and gray, shells in a soft state, with a little green sand.....	40.5
Ro. Pretlow.....	Blue marl, shells entire.....	18.2
Mrs. Ely.....	Gray marl, in clay, with a considerable amount of green sand.....	20.5
Nicholson's mill.....	Shells in sandy residuum, with trace of green sand.....	22.6
Major Ridley's.....	Dingy, yellow, tenaceous, shells entirely decomposed; green sand, a trace.....	29.0
Major Ridley's.....	Shells decomposed; green sand, a trace.....	51.3
Captain Briggs'.....	Large shells and fragments; green sand, a trace.....	38.4
Captain Briggs'.....	Lump marl, containing impressions of shells; green sand, a trace.....	61.4
Mr. Ivey.....	Perfect shells in a yellow, sandy clay; green sand, a trace.....	26.1
Mr. Bowden.....	Yellowish brown, cemented marl, with a very little green sand (upper part of the bank).....	79.0
Mr. Bowden.....	Bluish green marl, shells in considerable variety, with much green sand.....	31.3
Mr. Urquhart.....	Yellow marl with shells, green sand.....	27.3
Dr. Bowers'.....	Yellow sandy marls, shells much decomposed.....	16.0

SPOTSYLVANIA COUNTY

Was formed in 1720 from Essex, King William, and King & Queen. It is 23 miles long and 17 wide. The surface is rolling, and the soil on the ridges not very good; on the streams it is very fertile. It is drained by the head waters of North Anna and Mattaponi, and the Rappahannock forms its north boundary.

Population, 11,728. Number of acres of land, 257,277, assessed at \$1,284,045. Number of horses and mules, 1,792; cattle, 4,480; sheep, 2,287; swine, 5,360. The soil varies from sandy to a stiff clay. Price of land—improved, \$10 to \$20; unimproved \$3 to \$5 per acre. The productions are corn, wheat, oats and hay. Large quantities of poultry are sold in the adjacent cities, also vegetables and fruits. Grass grows well on enriched lands, and sheep would be largely and profitably raised but for the dogs.

Rich gold quartz is found in this county.

The city of Fredericksburg, in this county, is one of the prominent cities of the State, and is located on the south bank of the Rappahannock, at the head of tidewater. It is 61 miles from Richmond, on the Richmond, Fredericksburg and Potomac railroad. It is an important manufacturing town, and noted for its hospitality. It contains one woolen mill, three flouring mills, a plow and agricultural implement manufactory, canning establishments, three hotels, three newspapers, over one hundred stores and business houses, several fine churches, public buildings, &c. It is connected with Orange courthouse by a narrow-gauge railroad. A line of steamers connects with Baltimore and the northern cities. The population is about 6,000, and is increasing. This is a very healthy region of the State; the lands are cheap, and the county offers good inducements to immigrants.

STAFFORD COUNTY

Was formed in 1675 from Westmoreland. It is 20 miles long and 12 wide. The surface is rolling and the soil naturally good. It is watered by the Potomac and Rappahannock and their branches, with rich bottom lands.

Population, 6,420. Number of acres of land 168,505, assessed at \$1,033,630. Number of horses and mules, 1,432; cattle, 3,545; sheep, 2,493; swine, 7,978.

The productions are wheat, corn, rye, tobacco and potatoes. Price of land: Improved, \$5 to \$25; unimproved, \$2 to \$5 per acre. The soil varies from sandy to stiff clay loam. Average yield of main crops per acre: Wheat, 9 bushels; oats 12 to 15 bushels; buckwheat, 20 bushels; potatoes, 100 bushels; hay, 1 to 1½ tons. Sheep husbandry is popular and advancing. Dogs are complained of by the farmers as interfering with this interest. There are 25 schools in the county, of which 20 are public and in good condition; 14 churches, of which 3 are Episcopal, 5 Baptist, 4 Methodist, 1 Presbyterian, 1 Free. The county is self-sustaining, except pork. The Richmond and Fredericksburg railroad runs through it. Marl exists of both kinds, but whether much used we are not informed. Fruits of all kinds are represented as succeeding well. Gold, limestone and marble are found in considerable quantities in Stafford; also iron.

It is a very healthy county, with cheap land, offering good inducements to immigrants. Society is good, the people very hospitable, and willing to extend to persons seeking homes among them all proper attention and civilities.

SURRY COUNTY

Was formed in 1652. It is about 18 miles on a side. The surface is generally level. Soil light and not very productive, except on the streams. It has James river for its north boundary, and the Blackwater forms a portion of its southern boundary.

Population, 5,585. Number of acres of land, 163,313, assessed at \$735,455. Number of horses and mules, 1,130; cattle, 2,087; sheep, 1,007; swine, 7,133.

The productions are corn, wheat, oats, peanuts and lumber. The timber is chiefly pine and oak. About three-fourths of the county is in timber. Lands sell at from \$2 to \$10 per acre.

Yield per acre of the principal crops: Wheat, 12 bushels; oats, 15 bushels; potatoes, 60 bushels; peanuts, from 35 to 100 bushels; corn, 15 bushels. Fruits are largely cultivated; there are 10,000 acres in orchards of apples, peaches and pears, and a large surface in small fruits.

The county has 14 churches, viz: 1 Episcopal, 7 Methodist, and 6 Baptist. There have been about fifty settlers from other State, within the last few years. Marl exists in this county in great abundance and variety.

Analysis of Miocene Marls.

LOCALITIES.	OBSERVATIONS.	Per ct. carb. lime.
River shore, above mouth of College creek.....	Consisting of fragments of shells, in a light sand....	44.3
Booth's mill, Terrapin creek.....	Yellow marl, shells in sandy clay, with a little green sand.....	32.7
Joseph Pretlow, Terrapin run..	Yellowish gray marl, shells in silicious sand, with a little green sand.....	22.3
Blackwater, near Wall's bridge	Shells in a yellow, sandy clay, considerable green sand.....	37.0
Mr. Faulcon's.....	Yellow, with decomposed shells, occasionally slightly cemented.....	64.5
Three or four miles above Four-Mile Tree.....	Fragments of shells, slightly intermixed with green sand.....	47.2
Do.....	A yellow conglomerate of shells and casts.....	78.40
Near Four-Mile Tree.....	Fragments of shells and undecomposed shells.....	88.6
Mr. Allen's, Clermont.....	Yellowish white, fine and friable.....	71.5
Wakefield.....	Light, shells generally decomposed; green sand, a trace.....	51.1
Do.....	Bluish shells, very much decomposed.....	75.1
Douglas.....	White indurated casts of shells.....	87.5
Clermont (river shore).....	Blue, largely intermixed with green sand.....	10.2
Upper Chipoke creek.....	Very compact, containing fragments of shells.....	55.6
Stith's.....	Fragments of shell in sand, quite richly specked with green sand.....	42.0
Do.....	Do.....	33.0
A. C. Jones.....	Shells and fragments, intermixed with green sand.....	53.2
M. C. Jones.....	Grayish, with much green sand.....	28.3
Do. Lower stratum.....	Grayish yellow, with oxide iron and much green sand.....	43.2
Do. Upper stratum.....	Abounding in shells, and much green sand.....	62.7
Captain Smith, Courthouse.....	Bank made up of shells, and much green sand.....	72.9
Bacon's Castle.....	White pulverulent.....	97.7
Mr. D. Stith, Courthouse.....	White sand, with fragments of shells.....	35.
Union Hall.....	Very argillaceous.....	28.8

Professor Rogers says:

"A thin stratum of red ferruginous stone, containing a large proportion of oxide of iron, is found in this region. * * * * This stratum varies in thickness from an inch to a foot. The character of the ore in many localities is such as to promise great facility in reducing it to the metallic state, together with a large percentage of resulting metal.

"A specimen from above the marl at Mount Pleasant yielded, by analysis, in 100 grains—

Peroxide of iron.....	72.40
Alumina.....	3.80
Silica.....	7.71
Water.....	14.35
Loss.....	1.64
	<hr/> 100.

"It is by no means improbable that in some parts of this region the supply of iron ore may be found sufficient, with the advantage of shell limestone near by, to make its manufacture not only safe, but profitable."

SUSSEX COUNTY

Was formed in 1754 from Surry. It is 32 miles long and 18 wide. The surface is level or slightly rolling. Soil light and on the streams very productive. It is watered by Nottoway and Blackwater rivers—the first traversing it centrally, and the latter forming its northeast boundary.

Population, 7,885. Number of acres of land, 295,791, assessed at \$855,-629. Number of horses and mules, 1,391; cattle, 2,447; sheep, 1,407; swine, 7,450.

The chief products are peanuts, corn, oats and cotton. Price of land from \$5 to \$20 per acre. Much of the soil suits grass, and sheep would be profitably raised but for *dogs*. There is an abundance of marl (miocene), rich in lime, and has been used with universally good results. The Petersburg and Weldon railroad runs through its western border, and the Atlantic, Mississippi and Ohio railroad on its eastern border.

Analysis of Miocene Marls from this County.

LOCALITIES.	OBSERVATIONS.	Per ct. lime.
Colonel Blow's.....	Upper stratum, shells, green sand, a trace; residuum, ferruginous clay.....	36.3
Do.	From calcareous portion of the gray marl, indurated, considerable green sand.....	63.6
Do.	From the middle of the gray marl, no shells, occasional fragments, a mixture of white and green calcareous sand.....	31.8
Wm. H. Pegram.....	Shells blue, tenacious sandy clay.....	28.1
Chinquapin run, Wm. H. Pegram	Sandy residuum; green sand a trace.....	35.3
Do.	Shells in yellow, tenacious clay; considerable green sand; residuum sandy.....	33.0
Colonel Gee.....	Dingy yellow, comminuted fragments of shells; green sand a trace.....	42.9
Henry Birdsong.....	Shells in blue tenacious clay, sandy residuum; green sand a trace.....	39.5
Do.	Shells in yellow tenacious clay, sandy residuum; considerable green sand.....	32.7
Major Pacham's mill.....	Shells chiefly in a blue clay; a trace of green sand.....	39.0
Mrs. Blunt.....	Compact and indurated, gray, containing casts of shells; residuum chiefly green sand.....	79.7
Do.	Great variety of shells in blue sand; considerable green sand.....	30.3
Mr. Mason's.....	Indurated lump marl; bluish gray, containing casts of shells and a trace of green sand.....	70.4
Do.	Comminuted fragments of shells in a blue sandy clay, with perfect shells; a trace of green sand.....	50.4
Harrison's mill.....	Average character of upper marl, bluish white shells, generally decomposed.....	57.9
Do.	Lower portion of the bed, compact indurated lumps with casts of shells.....	59.0

TAZEWELL COUNTY

Was formed in 1799 from Russell and Wythe. It is 60 miles long and 25 wide. It is a mountainous region, with narrow valleys between the lofty mountains, in which the soil is of great fertility. It is watered by Clinch river, and Bluestone, a tributary of the Great Kanawha, and the head waters of Holston. Population, 10,791. Number of acres of land, 294,415, assessed at \$1,079,731. Number of horses and mules, 3,335; cattle, 12,278; sheep, 12,458; swine, 8,455. There are 15 manufacturing establishments in this county, with a capital of \$15,587, employing 21 hands, and producing good profits. Salt has been found by boring. This is a fine grass and stock county, and the lands bear a high price in the valleys and are cheap on the mountains. Native grasses abound, and stock-raising is profitably and cheaply prosecuted. The county is self-sustaining.

Large deposits of coal, iron ore, salt, limestone, gypsum and other minerals are found in this county, much of which lies undeveloped on account of its remoteness from public highways. Its great want is a railroad to develop its large resources. It is seen to contain a large amount of stock. It is a very healthy, fine region of country, inhabited by a hardy, industrious and energetic population.

WARREN COUNTY

Was formed in 1837 from Frederick and Shenandoah. It is 20 miles long by 12 wide. It lies on the western slope of the Blue Ridge mountains, between Page and Clarke counties, with the Shenandoah range forming part of the western boundary. The soil is very fertile, producing fine crops of wheat, corn, oats, rye, buckwheat, and all the varieties of grasses.

Population, 7,264. It contains 130,855 acres of land, assessed at \$1,333,674. Number of horses and mules, 1,997; cattle, 3,625; sheep, 5,715; hogs, 5,579. Parts of this county have a limestone soil, and it is a good grass and stock county. It produces annually about 50,000 bushels of wheat, 50,000 bushels of corn, 10,000 bushels of rye, and ample supplies of hay, fodder and meat. Iron and copper ores are found in this county.

Front Royal, the county seat, is about 130 miles from Richmond, and 20 miles from Winchester. This county contains probably the largest and finest vineyard in the State, and is admirably suited to the vine. The Manassas branch of the Virginia Midland railroad enters the county on the east at Manassas Gap and taps the Valley railroad on the west at Strasburg.

The Shenandoah river traverses the county centrally from its southern to its northern limits, and the numerous tributaries to this stream afford an abundant supply of water in all parts of the county. The owners of the soil are prudent, industrious and energetic, and enjoy as much prosperity as any people in the State.

WARWICK COUNTY

Was one of the eight original shires. It is 20 miles long by about 5 wide. The surface is level and the soil generally productive. It is drained by branches of the James, which forms its boundary on the south.

Population, 1,672. Number of acres of land, 43,210, assessed at \$305,-367. Number of horses and mules, 306 ; cattle, 1,136 ; sheep, 191 ; swine, 1,747.

The average price of land is \$7.50 per acre. The average yield per acre of the leading farm crops is : Of wheat, 15 bushels ; corn, 26 bushels ; oats, 35 bushels ; potatoes, 80 bushels. Two hundred acres are planted in orchards of apples, pears, peaches and apricots. There are six public schools in the county in first-rate condition. There are seven churches—one Methodist and the rest Baptist. The health of Warwick is first-rate. Large deposits are found in this county of excellent marl, containing about 90 per cent. of lime, but it is not stated by our correspondent whether it is much used. Fish and oysters abound, and the county is self-sustaining. Like other counties of this section, the land is of easy and cheap cultivation, and productive, and a cheap county to live in, with its fish and oysters and wild fowl. The winters are mild. The people of this section are noted for their hospitality, and immigrants will find pleasant and good homes here.

ANALYSIS OF MIOCENE MARL IN THIS COUNTY.

Mr. Wynn's.....	Per cent. carb. lime. 75.0
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WASHINGTON COUNTY

Occupies part of the valley between Clinch mountain and the Blue Ridge. It is 40 miles long and 18 wide. The soil is fertile and productive ; it is watered by the three forks of Holston, which divide it into three fertile valleys.

Population, 16,816. Number of acres of land, 360,104, assessed at \$3,446,981. Number of horses and mules, 5,049 ; cattle, 10,723 ; sheep, 10,208 ; swine, 11,839. The productions are the grains and grasses, and cattle and sheep. Abingdon, the largest town, is situated on Holston river,

in a fertile valley, and is surrounded by a fine rolling country of great beauty. It has a population of 2,500. There are fine water-powers in this county, only a small proportion of which is utilized. This is a healthy climate, and the people present a robust, healthy appearance. This is a fine section of the State, for which nature has done much, and the farmers are improving their lands and stock with great skill and industry. The Atlantic, Mississippi and Ohio railroad runs through the county. No doubt the county is more than self-sustaining, and the lands are in demand.

Inexhaustible beds of plaster and salt exist in North Holston and Walker's creek valleys. Saltville, the seat of large salt and gypsum mines, is in this county. It is connected by railroad with the Atlantic, Mississippi and Ohio railroad. It is a flourishing village. A more detailed account of Saltville and its mines will be found in a former portion of this work. Hydraulic limestone is found near Abingdon, containing 78 per cent. carbonate lime; 10 per cent. carbonate magnesia; silica, 10 per cent.; alumina and oxide of iron, 1.12 per cent. Another specimen has, carbonate lime, 61; carbonate magnesia, 28; alumina and oxide iron, 1; silica, 8.69. Another specimen, from Rich valley, carbonate lime, 50; carbonate magnesia, 41.52; alumina with oxide iron, .72; silica, 8.

WESTMORELAND COUNTY

Lies between the Potomac and Rappahannock, and is 30 miles long and 8 to 10 wide. The surface is level or gently rolling. The soil is good, particularly on the streams. It is watered by many tributaries of the Potomac, which abound in fine oysters, fish and wild fowl. Population, 7,682. Number of acres of land, 138,590, assessed at \$817,112. Number of horses and mules, 1,021; cattle, 4,840; sheep, 2,996; swine, 5,847. About one-third of the surface is in timber of oak, pine, poplar, chestnut, hickory, locust, walnut, &c. The price of land varies from \$3 to \$20 per acre. The productions are corn, wheat and oats, with some tobacco, ground-peas and potatoes. The average production per acre of wheat, 15 bushels; of corn, 20 bushels; of tobacco, 500 pounds; of oats, 20 bushels; clover, 1 ton. One thousand acres are planted in orchards. They have 22 public schools in good condition; 15 churches, of which 4 are Episcopal, 6 Methodist, and 5 Baptist. There have settled in this county within the last five years about 150 persons from other States. The health of the county is good, and winter climate mild and pleasant, and the farm products are ample for the support of the inhabitants. Marl abounds in the county, but has not been much used.

The lands are easily cultivated and productive, and it is a very cheap country to live in, with its fish, and oysters, and wild ducks. The society

is refined and sociable, and immigrants will find pleasant and profitable homes here. This county was the birthplace of the renowned George Washington. One sample of blue marl from Stradford Cliffs shows 44.30 per cent. carbonate of lime and a trace of green sand.

WISE COUNTY

Was formed in 1855 from Lee, Scott and Russell, and adjoins Buchanan on the east, with West Virginia on the west. It is a mountainous country, the streams from which flow into the Ohio river to the north and the Tennessee to the south and west. The farm products are not of great importance. The principal business of the people is pastoral. Large quantities of cattle and sheep are raised. It is a fine grass country—all kinds of grass flourishing well. Lands are very cheap—62½ cents per acre, one correspondent says—and stock-raising could be made very profitable. It is a good fruit country.

It has 518,404 acres of land, assessed at \$291,747. Number of horses and mules, 1,114; cattle, 4,455; sheep, 7,340; swine, 10,198. The population is 4,785. The county needs a railroad to develop its resources and make it a fine county. It contains iron and perhaps other ores. Gladesville, the county seat, is a flourishing village.

WYTHE COUNTY

Was formed in 1790 from Montgomery. It is 24 miles long and 20 wide. It is an elevated mountain valley, and the soil is rich and productive. In parts the surface is broken and mountainous. The county is drained by New river and its tributaries.

Population, 11,611. Number of acres of land, 358,461, assessed at \$2,601,940. Number of horses and mules, 3,483; cattle, 10,204; sheep, 7,433; swine, 11,904. This is a grazing county, the chief products being cattle, sheep, horses and hogs; but the farmers raise all of their supplies, and sell wheat and stock. 110,000 acres are in timber of oaks, hickory, chestnut, ash, pines, lynn, sugar maple, silver maple, sycamore, walnut and many other trees, all attaining large size. The water-power is vast, only a small proportion of which has been utilized. In this county are nine blast-furnaces for smelting iron ores; five forges and bloomeries; 1 nail and rolling-mill; 1 lead-smelting works and shot-tower; 1 woolen factory; 3 carriage factories; 1 furniture factory; 5 tanneries; 4 curriers; about 30 mills; 3 foundries; and 10 linseed oil mills. The price of land, from \$12 to \$30 per acre. The average yield per acre of the main crops: For wheat, 12 bushels; oats, 20 bushels; corn, 50 bushels; potatoes, 100 to 200 bushels; clover, 1½ to 2 tons; other grasses grown for grazing over

one-third of the county. About 400 acres planted in orchards. The estimated amount of honey made, over 40,000 pounds. Two newspapers are published in Wythe. There are 57 public white and 11 colored public schools, and 6 private schools. There are 50 churches—25 Methodist, 2 Lutheran, 8 Presbyterian, 1 Episcopal, 1 Baptist, and 1 Catholic; Union churches, 6. One bank with a capital of \$75,000. There have been 180 immigrants to this county in the last five years, of which number 144 are from England. Situated at an elevation of 2,000 to 2,500 feet above sea level, this county enjoys the purest air, and a very healthy climate. The Atlantic, Mississippi and Ohio railroad runs through the county. It abounds in minerals of various kinds, iron in vast quantities, lead, zinc, copper, manganese, baryta, steatite, limestone, coal and marble, most of which have been developed to a considerable extent. Wytheville, the county seat, is on the line of the Atlantic, Mississippi and Ohio railroad, 248 miles southwest of Richmond, and is a thriving and handsome town. The climate of Wytheville is said to be very equable, and invalids find it a very pleasant and healthy resort in summer. All this section is excellent for fruit.

Iron ore from Redd's creek in Wythe county, Graham's furnace, showed by analysis (Prof. Rogers), peroxide iron, 24.61 grains in the 30 grains, with no deleterious substance; color, light brown, close-grained, with cavernous structure. Near the lead mines hydraulic limestone is found containing 53 per cent. carbonate lime and 43 per cent. carb. magnesia, 1.70 of silica, and 0.50 of alumina and oxide of iron, inferred to be hydraulic.

YORK COUNTY

Was one of the original shires. It is 30 miles long and about 5 wide. It lies on Chesapeake bay and York river. The surface is level and the soil sandy and moderately fertile. It is drained by numerous creeks and estuaries, which abound in fine oysters, fish and fowl. Population, 7,198; Number of acres of land, 72,744, assessed at \$736,593. Number of horses and mules, 568; cattle, 2,780; sheep, 342; swine, 2,964. The productions are corn, wheat and oats. Price of land from \$2 to \$20 per acre. Marl abounds, and pays wherever it has been used—not much used at this time, on account of want of capital to apply it. Sheep would be profitable, and the people are much disposed to raise them, but are prevented in a great measure by dogs.

This county abounds in fish, oysters and game, and is easy of cultivation, and productive and cheap to live in; winters are mild and pleasant,

and the county generally healthy. Yorktown, the famous place of the surrender of the English forces to General Washington in our war for independence, is in this county on the York river.

PER CENT. OF CARBONATE LIME IN MIOCENE MARLS IN YORK COUNTY.

WHENCE OBTAINED.	GENERAL CHARACTER.	PER CENT. CARB. LIME.
M. R. Garnett, three miles } below Yorktown..... }	White pulverulent.....	90.2
Belle Farm, Major T. } Griffin..... }	Reddish yellow—fragments of shells.....	79.2
York Cliff.....	Rocky and sub-crystalline.....	87.3



